VOLUME 3 DECEMBER 1954 PART 1

REINWARDTIA

BEING A CONTINUATION OF THE

BULLETIN DU JARDIN BOTANIQUE DE BUITENZORG
(BULLETIN OF THE BOTANIC GARDENS, BUITENZORG)

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Published by
HERBARIUM BOGORIENSE
KEBUN RAYA INDONESIA

Reinwardtia Vol. 3, Part 1, pp. 1-155. BOGOR, December 1954

REINWARDTIA
Published by Herbarium Bogoriense, Kebun Raya Indonesia
Volume 3, Part 1, pp 27-66 (1954)

NOTES ON MALAYSIAN CYPERACEAE—II*

J. H. KERN**

SUMMARY

1. Since 1884 the name *Cyperus zollingeri* Steud. has been misapplied to a common tropical species, the correct name of which is *C. tenuiculmis* Boeck. It appears that *C. rubroviridis* Chermez. (1919) and *C. ramosii* Kükenth. (1925) are synonymous with *C. zollingeri* Steud. (1855).

2. *Cyperus leucocephalus* Retz. and *C. pulchellus* R. Br. are treated as specifically distinct. The Philippine record of *C. leucocephalus* is referred to *C. pulchellus*.

3. A tentative arrangement of the Malaysian material of the polymorphous *Cyperus sanguinolentus* Vahl is given.

4. *Mariscus maritimus* Miq. is reduced to *Cyperus dubius* Rottb., *C. pulcherrimus* f. *retiglumis* Valck. Sur. to the species.

5. The previous Malaysian records of *Cyperus stenostachyus* Benth. and *C. polystachyos* f. *longispiculatus* Valck. Sur. are erroneous.

6. A survey of the distribution of some Malaysian species is given.

7. The following new combinations are made: *Cyperus trialatus* (Boeck.) Kern; *C. sanguinolentus* ssp. *melanoccphalus* (Miq.) Kern, ssp. *cyrtostachys* (Miq.) Kern, and ssp. *teijsmannii* (Miq.) Kern.

This paper, containing some critical remarks on Malaysian species of *Cyperus*, is a continuation of one previously published in "Reinwardtia." Besides the material in the herbaria at Bogor (BO), Leyden (L), and Singapore (SING), on which the first contribution was based, I have been able to study the Malaysian collections of the genus in the following herbaria: British Museum (BM), Brussels (BR), Copenhagen (C), Florence (FI), Geneva (G), Gray Herbarium (GH), Groningen (GRO), Manila (PNH), Melbourne (MEL), Munich (M), New York (NY), Stockholm (S), Utrecht (U), Wageningen (WAG), and Washington (US). My sincere thanks are extended to the Directors of all these institutions for enabling me to study such a large number of specimens.

CYPERUS STENOSTACHYUS (non Benth.) sensu Valck. Sur.

Cyperus stenostachyus (*non* Benth.) *sensu* Valck. Sur., Gesl. Cyperus Mal. Arch. 112 *t.* 4 *f.* 25; *t.* 5 *f.* 7. 1898.

* Part I was published in Reinwardtia 2: 97-130. 1952.
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Some specimens found among the Malaysian indeterminata of the Rijksherbarium ("locus natalis prob. Java") were originally determined by Valckenier Suringar as *Cyperus fenzelianus* Steud. Clarke, to whom Valckenier Suringar had sent them, considered them to belong to *C. stenostachyus* Benth. (Fl. austral. 7: 280. 1878). Valckenier Suringar accepted this identification—which was copied by Kükenthal (*in* Engl., Pflanzenr. Heft 101: 103. 1935)—but already pointed to the fact that the specimens strongly resemble some others referred by Clarke to *C. longus* var. *badius*. Indeed Clarke's determination must be erroneous, as the description of *C. stenostachyus* is not at all applicable to these specimens.

According to S. T. Blake [*in* Univ. Queensl. Papers 2 (2): 5. 1942] *C. stenostachyus* is identical with the South African *C. tenuiflorus* Rottb., to which species also the said specimens certainly do not belong. A renewed investigation has shown that they represent the Mediterranean *C. longus* L. ssp. *badius* (Desf.) A. & G. (*C. badius* Desf.), and undoubtedly do not originate from Java. There is no original label in the collector's handwriting.

CYPERUS ZOLLINGERI Steud. and C. TENUICULMIS Boeck.

It appears that since C. B. Clarke wrote his article "On the Indian species of Cyperus" (*in* J. Linn. Soc., Lond., Bot. 21: 1-202. 1884) there has been a regrettable confusion in the application of the name *Cyperus zollingeri* Steud. Until I saw Steudel's type, I followed Clarke, Kükenthal, and others in applying this name to a well-known, widely distributed species, to which it, however, certainly does not belong.

Recently I have been able to study the specimens of Zollinger 2689, the type number of *C. zollingeri* Steud., in the Herbaria of the British Museum, Geneva, Florence, and in the Gray Herbarium (that in Florence is erroneously numbered 2869), and then I realized that they belonged to the species which was described again in 1925 by Kükenthal as *Cyperus rennsii*.

The name *Cyperus zollingeri* Steud. is met with for the first time in Zollinger's "Systematisches Verzeichniss" (p. 62) as a *nomen nudum*: "1370. In fruticetis humidis pr. Pardana VI. 2689 ad vias pr. Puger Pr. Bondowoso II." It was validly published in Steudel's "Synopsis," and as here only Zollinger 2689 is cited, this number has to be accepted as the type-collection of the species. Some characters in the original description already aroused doubts as to the identity of the currently accepted "*Cyperus zollingeri*" with Steudel's type specimen: "Culmo subtriquetro

... foliis flaccidulis angustis ... radiis apice 1-4-stachyis ..., squamis lateribus flavescenti-albis." In what is nowadays usually called *C. zollingeri* the stems are distinctly triquetrous, the leaves more or less rigid, and the rays of the anthela nearly always bear more than 4 spikelets.

Boeckeler (*in* Linnaea 36: 352. 1870) mentions only the type collection, Zollinger 2689, under *Cyperus zollingeri* Steud. From his much more detailed description it is clear that he had not Clarke's and Kükenthal's *C. zollingeri* before him: "Radice fibrosa tenui; culmis ... tenuibus triangulis; foliis ... angustis (½—1 lin. lat.) membranaceis, floralibus ... umbellam aequantibus v. parum superantibus; ... radiis apice 3-2-1 stachyis, ... squamis lateribus stramineo-pallidis; caryopsi ... turbinato-obovata." The description of the achene especially shows that there can be no question of *C. zollingeri* in the current sense, this species having an elliptic or at most a slightly obovate achene, certainly not a turbinate one. In passing it may be remarked that Boeckeler corrected Steudel's error. The latter ascribed a wingless rhachilla to the spikelets. Steudel was probably misled by the rather caducous nature of the distinct wings.

The common tropical species was correctly distinguished by Boeckeler and described as *Cyperus tenuiculmis*. The specimen which must be considered as its type (Wallich 3321, K!) and those also cited by Boeckeler (Mont. Khasia, alt. 4000 ped., Hook. et Thoms. sub *C. compressus* var.; and Thwaites C.P. 807), of which I have seen several specimens, do not leave the least doubt as to the identity. *Cyperus tenuiculmis* Boeck. is the correct name of the common tropical species, from which *C. zollingeri* Steud. is quite distinct.

I have already pointed to the fact that the confusion began with Clarke. In his paper mentioned above he still used the name *C. tenuiculmis* for it (p. 5), but on page 15 he said: *C. tenuiculmis*, Boeck. = *C. zollingeri*, Steud. = *C. lucidulus*, Klein, whereas on page 99 he accepts the latter name, treating *C. zollingeri*, *C. tenuiculmis*, *C. schweinfurthianus* Boeck., and *C. compressus* var. Thwaites, Hook. & Thoms. as synonyms. In the "Flora of British India" he excluded the name *C. lucidulus* from the synonymy, and accepted the name *C. zollingeri*. Yet Clarke examined Zollinger 2689, as appears from the label he attached to one of the sheets, but unfortunately he did not observe the differences between this specimen and those of *C. tenuiculmis*. Valckenier Suringar had seen Boeckeler's specimen of *C. zollingeri* in the Berlin Herbarium, but nevertheless his description only refers to *C. tenuiculmis*, which name is not even enumerated in synonymy. Kükenthal followed Clarke and Valckenier Suringar. The figures in Clarke's "Illustrations of Cyperaceae," Koorders's "Atlas,"

Backer's "Onkruidflora," and also that given by me in "Reinwardtia," all represent *C. tenuiculmis*.

Previously (*in* Reinwardtia 2: 109. 1952) I concluded that *Cyperus rubroviridis* Cherm. was conspecific with *C. ramosii* (i.e. *C. zollingeri*). My conclusion was strengthened by the examination of Perrier de la Bâthie 13026 (K, as *C. rubroviridis*, *det.* Chermezon) from Madagascar, Schlechter 12083 from Delagoa Bay (K, L), determined by Clarke as *C. sphacelatus* Rottb., and Kirk *s.n.* from Zambesia, Tette (ditto), all referred by Kükenthal to *C. rubroviridis*. Some spikes bear up to seven spikelets, but otherwise I am unable to find valid differences.

I have seen *C. zollingeri* also from southern Rhodesia [Brain 8767 (K)], Nyassaland [Lawrence 25 (K)], Senegambia [Heudelot 485 (K)], and Australia [Queensland, S. T. Blake 13487 (K)].

It will be useful to sum up the chief synonymy involved in this unfortunate confusion:

CYPERUS TENUICULMIS Boeck. *in* Linnaea 36: 286. 1870; Scheffer *in* Nat. T. Ned. Ind. 34: 50. 1874. — Wallich 3321!

Cyperus longus β Miq., Fl. Ind. bat. 3: 275. 1856. — Junghuhn 468!

Cyperus compressus var. *spiculis angustis* Thw., Enum. Pl. zeyl. 342. 1864. — Thwaites CP807!

Cyperus luzulinus (non Klein) *sensu* C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 99. 1884.

Cyperus zollingeri (*non* Steud.) *sensu* C. B. Clarke *in* Fl. Brit. Ind. 6: 613. 1893; Valck. Sur., Gesl. Cyperus Mal. Arch. 118 *t.* 5 *f.* 28. 1898; Ridl., Mat. 3: 68. 1907; C. B. Clarke *in* Philip. J. Sci., Bot. 2: 85. 1907; Ill. Cyper. *t.* 18 *f.* 1-2. 1909; Koorders, ExkFl. Java 1: 190. 1911; 4 (Atlas): *f.* 219. 1922; Merrill, Fl. Manila 112. 1912; E. G. Camus *in* Lecomte, Fl. gén. Indo-Ch. 7: 67 *f.* 7, 3-5. 1912; Merrill, Bibl. Enum. Born. Pl. 56. 1921; Enum. Philip. fl. Pl. 1: 108. 1923 (excl. Ramos 7672); Kükenth. *in* Bot. Jb. 49: 44. 1924; Ridl., Fl. Mal. Pen. 5: 144. 1925; Kükenth. *in* Engl., Pflanzenr. Heft 101: 133. 1935 incl. var. *condensatus* Kükenth.; *in* Bot. Jb. 69: 255. 1938; Ohwi *in* Bot. Mag., Tokyo 56: 200. 1942; *in* Mem. Coll. Sci., Kyoto, B 18: 131. 1944; S. T. Blake *in* J. Arnold Arb. 28: 214. 1947; Backer, Bekn. Flora Java, Nooduitg., Fam. 246: 37. 1949; Kern *in* Reinwardtia 2: 108 *f.* 6. 1952.

CYPERUS ZOLLINGERI Steud. *in* Zoll., Syst. Verz. ind. Arch. Heft 1: 62. 1854 (nomen nudum); Syn. Pl. glum. 2: 17. 1855; Miq., Fl. Ind. bat. 3: 264. 1856; Boeck. *in* Linnaea 36: 352. 1870. — Zollinger 2689!

Cyperus ramosii Kükenth. *in* Fedde, Rep. 21: 326. 1925; *in* Engl., Pflanzenr. Heft 101: 136. 1935; *in* Bot. Jb. 69: 255. 1938; Kern *in* Reinwardtia 2: 109 *f.* 7. 1952. — Ramos 7672.

Cyperus rubroviridis Chermez. *in* Bull. Soc. bot. France 66: 350. 1919; cf. Kern *in* Reinwardtia 2: 109. 1952. — Perrier de la Bâthie 2395, 2433, 2458.

Cyperus sphacelatus Rottb. var. *tenuior* C. B. Clarke *in* Thiselton-Dyer, Fl. trop. Afr. 8: 347. 1901. — Heudelot 485!

In his monograph Kükenthal enumerates a series of varieties under *Cyperus zollingeri* (*i.e. C. tenuiculmis*), which can not automatically be transferred to the latter binomium. I could study only:

(i) Variety *parvus* C. B. Clarke. Of the collections cited by Clarke in the "Flora of tropical Africa" I have seen Hens A220 and Hens C159 (L). As Clarke did not distinguish between *Cyperus zollingeri* and *C. tenuiculmis*, it is not surprising that his variety is a mixture: Hens C159 belongs to *C. zollingeri*, Hens C120 is a mixture of *C. tenuiculmis* and *C. sphacelatus* Rottb. I propose to consider Hens C159 as the type of *C. zollingeri* var. *parvus*, which then comprises small, slender specimens with much depauperated anthela (in the Leyden specimens even reduced to the central spike). Apparently it does not deserve varietal rank.

(ii) Variety *condensatus* Kükenth. I have seen Griffith 6210 (C, L); Merrill 2784 (G, L, NY, US); Ramos 1106 (US); Merrill 9310 (BO, GH, SING, US); they all belong to *Cyperus tenuiculmis*. It seems superfluous to transfer the variety to this species, as it comprises only somewhat stout specimens.

(iii) Variety *schweinfurthianus* (Boeck.) Kükenth. This is *Cyperus schweinfurthianus* Boeck., which is very close to *C. tenuiculmis*, but has nothing to do with *C. zollingeri*. I have seen only a single specimen, striking by its stoutness, the scabrous apex of the stems, the large spikelets, and the conspicuously mucronate glumes. It may represent a separate species.

CYPERUS NUTANS Vahl in the Philippines

Cyperus nutans Vahl has not yet been recorded from the Philippines, either by Merrill in his "Enumeration of Philippine flowering plants" or in Kükenthal's monograph.

Of the specimens, which these authors cited under *C. eleusinoides* Kunth, Bacani FB15978 (US; from Luzon, Prov. of Benguet), certainly belongs to that species, which I have also seen from Luzon Central, Loher 728 (M), and from Rio Tangco, Manila, Loher 729 (K).

But on the other hand the following collections have also been cited under *C. eleusinoides*, although they undoubtedly represent *C. nutans*: Luzon, Nueva Ecija, San José lo Carranglang, May 26, 1902, Merrill 226 (US)! Mindanao, Bukidnon Subprov., vicinity of Tanculan, July 1916, Fénix BS24950 (NY, US)! I have not seen Castillo BS22728 and MacGregor BS8747. Additional specimens of *Cyperus nutans* collected in the Philippines are: Luzon, Bontoc subprov., July 3, 1914, Vanoverbergh 733 (FI)!, Pangasinan Prov., San Manuel, Clemens 18102 (SING)!

Kükenthal (*in* Pflanzenr. Heft 101: 145. 1935) describes *C. eleusinoides* var. *subprolixus* Kükenth. thus: Spiculae saepe angustiores 8—12 mm longae 10—14-florae. Squamae ellipticae. Nux late oblonga. This variety is mentioned as occurring in two localities in the northwestern Himalaya, in the Liu Kiu Islands, and in the Philippines (Luzon, Prov. of Nueva Vizcaya, vicinity of Dupax, March—April 1912, MacGregor 14264). At least the specimen of this latter collection in the National Museum Herbarium, Washington, is a depauperate *C. rotans*, as it cannot be referred to *C. eleusinoides* on account of the scarcely mucronulate glumes and the oblong achene.

Cyperus trialatus (Boeck.) Kern, *comb. nov.*—**Fig. 1, 2**

Scirpus trialatus Boeck. *in* Flora 42: 445. 1859; *in* Linnaea 36: 721. 1870. — Malacca, Griffith s.n.!

Cyperus baeuanus Miq., Fl. Ind. bat., Suppl. 599. 1861; Ridl., Mat. 3: 65. 1907; E. G. Camus *in* Lecomte, Fl. Gén. Indo-Ch. 7: 56 *f. 8, 10.* 1912; Ridl., Fl. Mal. Pen. 5: 143. 1925. — *Cyperus diffusus* ssp. *baeuanus* (Miq.) Kükenth. *in* Engl. Pflanzenr. Heft 101: 209. 1936. — Banka, Kurz s.n.!

Cyperus turgidulus C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 130. 1884; in Hook. *f.*, Fl. Brit. Ind. 6: 604. 1893; Illustr. Cyper. *t. 18 f. 4-5.* 1909. — *Cyperus diffusus* f. *turgidulus* (C. B. Clarke) Valck. Sur., Gesl. Cyperus Mal. Arch. 100 *t. 4 f. 19.* 1898. — Based on *Scirpus trialatus* Boeck.

The distribution of this species is still insufficiently known. I have seen the following specimens from Malaysia:

SUMATRA. East Coast. Subdiv. Labuhanbatu, Kotapinang Distr., Langga Pajung, *Rahmat si Boeea 3661* (NY, US); Sabungan, *Rahmat si Boeea 3754* (NY, US); Gunung si Papan, *Rahmat si Boeea 3697* (NY). BANKA: *Bünnemeijer 1722* (L, U, K), *Kurz s.n.* (U, *type of C. baeuanus* Miq.); Lobok besar, *Kostermans 877* (BO). BILLITON: *Riedel s.n.* (Fl); Tandjongpandan, *Teysmann s.n.* (BO, L). — MALAY PENINSULA. Setul: *Ridley 15833* (SING, BM). Wellesley: *Ridley s.n.* (SING). Perak: Taiping, *Hose 45* (SING). Pahang: between Pekan and Ayer Tawar, *Burkill & Haniff 17264* (SING); Pekan, *Ridley s.n.* (SING). Malacca: *Griffith s.n.* (Fl, BM; *type collection of Scirpus trialatus* Boeck.); St John's Hill, *Herrey s.n.* (SING). P. Penang: Tanjung Bunga, *Curtis 883* (SING); Waterfall, *Curtis s.n.* (SING, BM). Singapore: *Cantley's coll. 2993* (SING), *Ridley 11511* (SING), *s.n.* (BM), *Sinclair s.n.* (BO, L). — JAVA. Exact locality unknown: *Ploem s.n.* (L). KARIMUNDJAWA Is.: *Karta 189* (BO, U), *288* (BO, L), *407* (BO, L, NY, SING), *Koorders 50* (BO). — LESSER SUNDA ISLANDS. SUMBAWA (?), *Ploem s.n.* (L). — BORNEO. East Borneo. W. Kutai, Samarinda Distr., *Posthumus 2116* (BO, GH, L).

De Vore & Hoover 280 (K) from Mindanao, which according to Kükenthal is *C. trialatus*, "Uebergangsform zu *C. diffusus*," is true *C. diffusus*. *Cyperus trialatus* seems to be restricted to the Asiatic continent and the western part of Malaysia, and not to reach the Philippines.

FIG. 1. *Cyperus trialatus* (Boeck.) Kern: *a*, habit, 0.7 ×; *b*, spikelet, 15 ×; *c*, glume, lateral view, 15 ×; *d*, deflorate flower, 15 ×; *e*, achene 15 ×. — After Squires 907 from Anam (SING).

FIG. 2. Distribution of *Cyperus trialatus* (Boeck.) Kern in Malaya.

The Ploem specimens cited from Java and Sumbawa respectively are undoubtedly erroneously localized and came possibly from Banka.

CYPERUS CINEREOBRUNNEUS Kükenth.—Fig. 3

Cyperus cinereobrunneus Kükenth. *in* Mitt. thür. Bot. Ver. II Heft 50: 3. 1943. — Lectotypus, Brass 7418 (U)! — *Cyperus cinereobrunneus* Kükenth. *ex* Blake *in* J. Arnold Arb. 28: 216 *f. 1A*. 1947. — Brass 7418 (BRI).

The type collection (Papua, Western Division: Oroville Camp, Fly River, Aug. 1936) has remained the only record known up to the present. According to Blake the specimen in the Brisbane Herbarium consists of a single culm with a very short piece of rhizome attached. There is a very fine specimen of the collection in the Utrecht Herbarium, determined by Kükenthal, which enabled me to verify the important points of difference between the two descriptions cited above.

Stems up to 50 cm tall; leaves distinctly scabrous and up to 6 mm wide; primary rays of the anthela 6—10, slightly scaberulous at the top; spikes consisting of 4—10 linear-oblong, up to 20-flowered spikelets; glumes indistinctly mucronulate; stamens 3 (not 2 as Kükenthal indicates!), with linear filaments and 0.7—1 mm long anthers; style 0.5—1 mm long, stigmas 0.5—0.75 mm.

FIG. 3. *Cyperus cinereobrunneus* Kükenth.: *a*, habit, 0.5 ×; *b*, spikelet, 6 ×; *c*, deflorate flower, 9 ×; *d*, stamen, 9 ×; *e*, glume, 6 ×; *f*, part of rhachilla, 6 ×. — After Brass 7418 (U).

CYPERUS MEISTOSTYLUS S. T. Blake—Fig. 4

Cyperus meistostylus S. T. Blake in J. Arnold Arb. 28: 217 *f. 1ff.* 1947.

Blake distinguished this species from the closely allied *C. cinereobrunneus* mainly by the less numerous leaves, the less distinctly digitate spikelets, the relatively longer nut, and the shorter style.

As to the length of the style ("brevissimus minus quam 0.1 mm longus") it may be remarked that in the isotypes (BO, L!) the style is up to 0.25 mm long.

Additional points of difference from *C. cinereobrunneus* are: stems smooth (in *C. cinereobrunneus* scaberulous at the top); leaves less scaberulous, spikelets narrower, not linear-oblong but linear; glumes smaller (in *C. cinereobrunneus* 2.3—3 mm long, in *C. meistostylus* 2—2.5 mm).

There are two further collections in the Bogor Herbarium which I refer to *C. meistostylus*, although they slightly deviate from the type-collection by broader, not fimbriate stigmas and a 0.3 mm long style.

NEW GUINEA. Netherlands New Guinea. Albatros Bivouac, hill top, about 150 m, common, May 1926, *Docters van Leeuwen 9066* (BO)! Mamberamo, ridge of hills, in primary forest, about 75 m, Nov. 1926, *Docters van Leeuwen 11192* (BO)!

CYPERUS PULCHERRIMUS Willd. ex Kunth

Cyperus pulcherrimus Willd. *ex* Kunth *f. rectiglumis* Valck. Sur., Gesl. Cyperus Mal. Arch. 95 *t. 4 f. 18.* 1898. — *Cyperus pulcherrimus* var. *rectiglumis* (Valck. Sur.) Kükenth. *in* Engl., Pflanzenr. Heft 101: 242. 1936. — West Java, Tjideruk, Boerlage s.n. (lectotypus; L); Muara Tjiomas, Boerlage s.n. (L)!

This form was described as follows:

"Differt a forma primaria: spiculis linearibus, saepe 9: 1¼ m.M., ± 40 floris, laete fusci, rare (non nunquam) curvatis."—Valckenier Suringar (*l.c.*).

Obviously "glumis" must be intercalated before "rare," as Valckenier Suringar wrote on the type-sheet, "glumae weinig ingekruld" (= glumes but slightly incurved), and Kükenthal says, "Spiculae ad 40-florae. Squamae apice rectae."

Whether the glumes in herbarium specimens of this species are more or less incurved at the apex, depends entirely on the state in which the plant was gathered, above all on the degree of maturity, a fact I could often verify in the field. Strongly incurved glumes become straight when boiled up. Careful examination of Boerlage's specimens showed that the distinction of the form had not been based on really existing differences: several glumes are distinctly incurved (hence perhaps "non nunquam" in

FIG. 4. *Cyperus meistostylus* S. T. Blake: *a*, habit, 0.5 ×; *b*, spikelet 10 ×; *c*, glume, unfolded, 12.5 ×; *d*, part of rhachilla, 10 ×; *e*, achene, 10 ×; *f*, deflorate flower, 10 ×; *g*, stamen, 25 ×. — After Docters van Leeuwen 11192 (BO).

the original description?). A wide range of herbarium specimens revealed the untenability of the taxon, which I therefore reduce to the species.

Kükenthal mentions "var. *rectiglumis*" also from the Philippines: Luzon, Irosine, Elmer 15154; Palawan, Foxworthy 854. Elmer 15154 was distributed as *Cyperus silletensis* Nees, an Indian species very close to *C. pulcherrimus* but with straight glumes. However, all the specimens of Elmer's number which I have examined (BO, C, FI, G, GH, L, NY, S, U, US) belong to the very distant *C. pumilus* L. As appears from a label attached to the sheet, Kükenthal's statement was based on the specimen in the Stockholm herbarium. Elmer 15154 has also been cited by Kükenthal under *C. pumilus*. Foxworthy 854 (BO, NY!) is very young *C. pulcherrimus*.

Kunth placed *Cyperus pulcherrimus* in section *Haspani*, rightly I think. Clarke removed it to section *Fusci*, and Kükenthal followed him.

"As to *C. pulcherrimus* it seems (with *C. silletensis*) to me to stand very naturally next *C. difformis* and *C. fuscus;* indeed I find *C. pulcherrimus, C. silletensis*, and *C. difformis* are much confounded in herbaria."—C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 119. 1884.

To my mind *Cyperus pulcherrimus* in every respect shows much more affinity to *C. haspan* and *C. tenuispica* than to *C. fuscus* and *C. difformis*. Besides, the confusion in herbaria with the former species is much more frequent than with the latter ones. I do not see any argument to sustain Clarke's opinion.

CYPERUS TENUISPICA Steud.

Some remarks on the synonymy of this often overlooked and misinterpreted species may complete my previous survey (*in* Reinwardtia 2: 116. 1952).

Merrill (Spec. Blanc. 79. 1918) reduced *Cyperus caespitosus* Llanos [Fragm. Pl. Filip. 14. 1851 ("*caespitorus*"); F.-Vill. & Naves *in* Blanco, Fl. Filip., ed. 3, 4 (1): 8. 1880] to *C. haspan* L. In my opinion it rather belongs to *C. tenuispica*, which species was not recognized by Merrill. The description evidently points to that species: "Involucrum commune foliola 2, altero umbellam superante ... Squamae obtusae, discretae, patulae. Achenium globosum." Is it purely accidental that the illustrative specimens of Species Blancoanae 999 I have seen (BM, BO, GH, K, L, NY, US) are all fine examples of *C. tenuispica*? I appoint the specimen in the Leyden Herbarium the neotype of *C. caespitosus* Llanos.

As to the identity of *Scirpus autumnalis* L. there had been much confusion until Clarke (*in* J. Linn. Soc., Lond., Bot. 30: 311. 1894) found

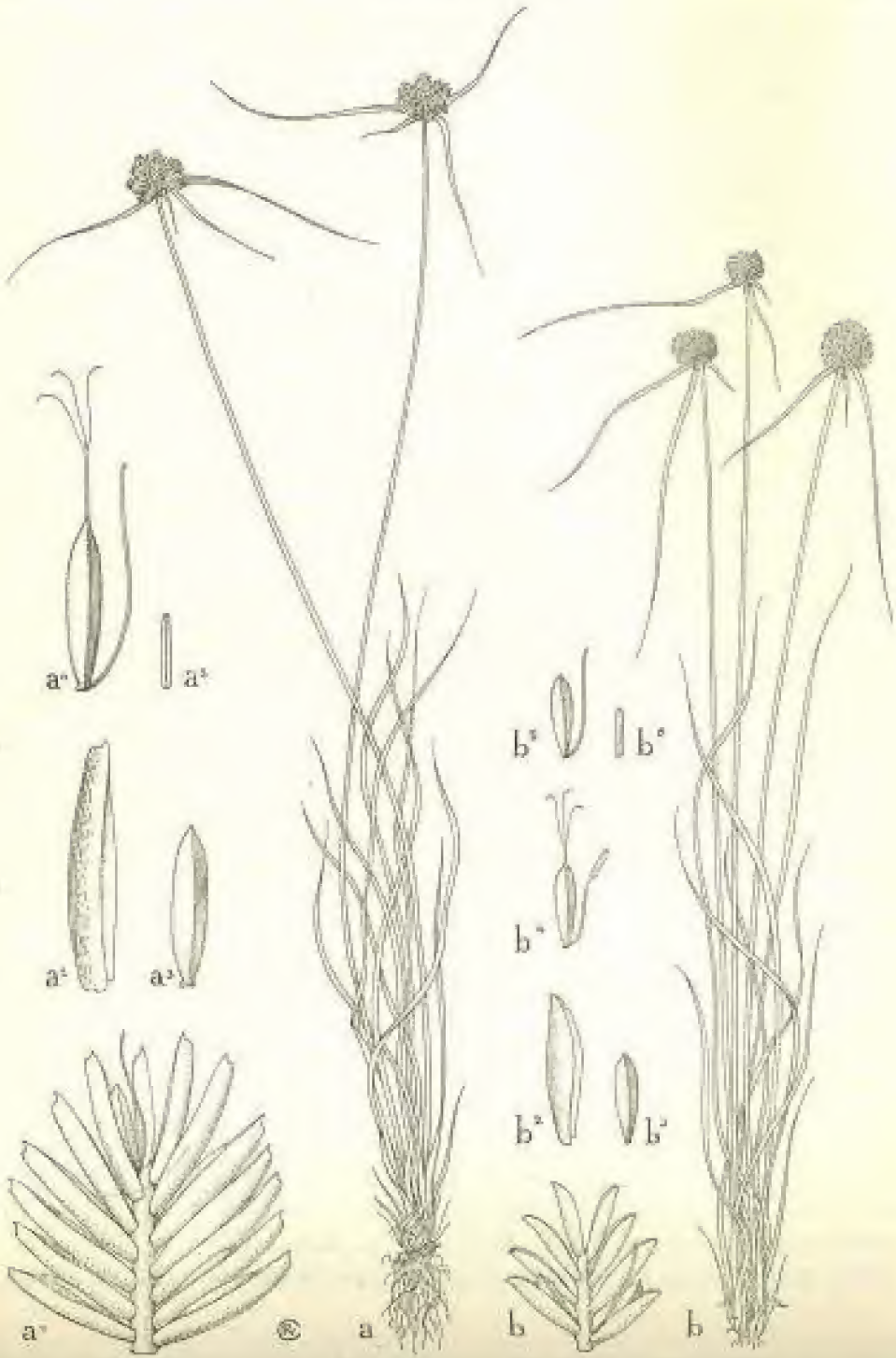
the only sheet in the Linnean Herbarium marked "*Scirpus autumnalis*" in Linnaeus's hand to represent a *Fimbristylis*. Rottboell and Vahl erroneously took *Scirpus autumnalis* to be a *Cyperus*. In the Copenhagen Herbarium there are three sheets bearing the name *Scirpus autumnalis* in Vahl's handwriting.

(i) One specimen ex herb. Rottboell. On the sheet is written "*Scirpus autumnalis?* tab. 17 f. 3. no. 78" (in a different handwriting "*Cyperus Haspan* L."). This is the specimen figured in Rottboell's "Descriptiones et Icones" (*l.c.*). Undoubtedly it represents *C. tenuispica* Steud. Consequently Rottboell's figure was misinterpreted by Kükenthal (*in* Pflanzenr. Heft 101: 247. 1936) who took it to be *C. haspan*. The details on the plate (a spikelet, glumes, and a triandrous flower), however, can not have been drawn from the young specimen cited, as they do not belong to *C. tenuispica*.

(ii) Two specimens ex herb. Vahl, one of them with the inscription "*Cyperus autumnalis*" (in a different handwriting "*Haspan* L.") and "Habitat in agris oryzaeis König"; the other with "*Cyperus autumnalis, Cyperus microstachys*" (in a different handwriting "*Cyperus Haspan* L.") and "Rottb. descript. pag. 58 no 78 tab. 17 f. 3." These specimens too certainly represent *C. tenuispica*. In Vahl's "Enumeratio" we find mentioned two allied species: *C. autumnalis* (L.) Vahl and *C. haspan* L. The latter one, "praecedenti tam similis, ut non differre videatur, praeterquam habitu robustiore et radiis umbellae spiculisque copiosioribus," presumably comprises the coarse form of *Cyperus haspan* treated by Kükenthal as the New World subspecies *juncoides*, which, however, also inhabits the tropics of the Old World. Kükenthal considered "*C. autumnalis* Vahl" a synonym of *C. haspan* ssp. *juncoides* (Lamk.) Kükenth., but it belonged at least partly to *C. tenuispica*. Apparently Vahl did not distinguish between this species and annual forms of *C. haspan*.

CYPERUS LEUCOCEPHALUS Retz. and CYPERUS PULCHELLUS R. Br.
Fig. 5

In Kükenthal's monograph on *Cyperus* we find as synonyms of *Cyperus leucocephalus* Retz. the following names: *Cyperus pulchellus* R. Br., *C. sorostachys* Boeck., *C. sesterioides* (non H.B.K.) sensu Ridl., *Sorostachys kyllingioides* Steud., and *Kyllinga pierreana* E. G. Camus. The area of the species is indicated as extending from India through Further India and Malaysia to tropical Australia; moreover it is also stated to be widely distributed in Africa. According to Kükenthal it occurs everywhere scattered; so for instance only two specimens are mentioned from


a¹
a²
a³
a⁴
a
b¹
b²
b³
b⁴
b⁵
b
b

the Malaysian region, one of them moreover very dubious as to the locality: Malay Archipelago ("Wallis n. 62 in Herb. mus. berol. cum nota 'vix e Brasilia ortus est., cl. Wallis etiam in Malesia collegit'") and Philippines (Cuming 417; this number should be 1417!). The first specimen was lost during the war. Of Cuming 1417, I have seen several specimens in several herbaria. However, I am convinced that they do not belong to *Cyperus leucocephalus* Retz., and that Kükenthal made a mistake in referring all the synonyms cited above to this species.

Cyperus leucocephalus Retz. (Observ. 5: 11. 1789) was based on a specimen of König's, "habitat in nemorosis Tschandranconae," which is preserved in the Lund Herbarium (!). From Retzius's description I cite: "Involucrum tetraphyllum ... Spicae 8—12 ... Squamae lineares ... compressae ... Semen longum lineare, ... nigrum."

The type of *Cyperus pulchellus* R. Br. is an Australian specimen from Arnhem Bay (R. Brown 5917; BM!); it was described, "Culmis erectis setaceis; involucris triphyllis elongatis divaricatis; capitulo globoso polystachyo, spiculis linearibus; squamis membranaceis obtusis monandris." —R. Brown (Prod. Fl. Nov. Holl. 213. 1810).

Steudel, in his Synopsis, *vide infra*, distinguished both species mentioned above, and in addition described *Sorostachys kyllingioides* Steud., based on Cuming 1417 from Luzon (also said to occur in Senegal), characterized by its "achenium oblongum ... involucri triphylli ... capitulo ovato-subrotundo densissime spiculis coacervatis composito ... squamis vix ½ lineam longis."

Cyperus sorostachys Boeck. is only a new name for *Sorostachys kyllingioides* Steud., as Boeckeler did not accept Steudel's monotypic genus, but correctly referred it to *Cyperus*. In addition Boeckeler distinguished *Cyperus leucocephalus* Retz. and he sharply distinguished them mainly by the following differences:

Cyperus leucocephalus Retz.: Stems many-leaved. Involucral bracts 4, ⅝ — ¼' long. Inflorescence semiglobose, 3—4" thick, composed of 8—12 spikelets. Glumes approximate, incurved, linear, with rather obtuse subdenticulate apex. Achene more than half as long as the glume, broadly oblong, rather obtuse at both ends. Style elongate.

EXPLANATION OF FIGURE 5

FIG. 5. *Cyperus leucocephalus* Retz. and *C. pulchellus* R. Br. — *Cyperus leucocephalus*: *a*, habit, somewhat reduced; a^1, spikelet, 10 ×; a^2, glume, 15 ×; a^3, achene, 15 ×; a^4, deflorate flower, 15 ×; a^5, anther, 15 ×. — *Cyperus pulchellus*: *a*, habit, somewhat reduced; b^1, spikelet, 10 ×; b^2, glume, 15 ×; b^3, achene, 15 ×; b^4, b^5, deflorate flowers, 15 ×; b^6, anthers, 15 ×. — *a*, After Rel. Holf. 147 (L); *b*, after Cuming 1417 (FI).

Cyperus sorostachys Boeck.: Stems few-leaved. Involucral bracts 3, 3—½' long. Inflorescence subglobose, 2½—3½" thick, many-spiculate. Glumes rather distant, straight, hardly ½" long, narrow, oblong-linear, the apex rather obtuse. Achene very small, nearly half as long as the glume, slightly tapering towards the base. Style short, trifid, bifid or undivided.

The latter statement is erroneous: in Cuming 1417 the style is always trifid. Except for the number of leaves and bracts the differences given are so clear, that in my opinion there can be no doubt that *Cyperus leucocephalus* and *C. sorostachys*, though closely allied, are specifically distinct.

As appears from a specimen in the Copenhagen Herbarium, Boeckeler was aware later on of the fact that his *Cyperus sorostachys* had an earlier synonym, for he wrote on the label "*Cyperus pulchellus* R. Br. fide Bentham, *C. sorostachys* Bcklr. alius." Indeed Bentham described *C. pulchellus* clearly and added, "The species is also in East India and the Malayan Archipelago. It is very closely allied to *C. leucocephalus*, Retz."

As for the other names cited by Kükenthal I did not see the specimen referred by Ridley to *Cyperus sesleriioides* H.B.K.

Kyllinga pierreana E. G. Camus was based on a specimen from Cochin China (*leg.* Pierre) which I have not seen. The only specimen named as such in the Leyden Herbarium originates from Cochin China (June 1909, *leg.* d'Alleizette). It is true *Cyperus leucocephalus*.

There is still another name that has to be considered, viz., *Scirpus coronarius* Vahl. Neither Clarke nor Kükenthal could definitely place this binomium. Clarke supposed it to be synonymous with *C. leucocephalus*, and Kükenthal followed him. I have seen the type in the Copenhagen Herbarium. Vahl's remark in his "Enumeratio," "rarissime spica parum infra capitulum sessilis," obviously refers to the left culm on the type-sheet; on the latter Vahl wrote:

"*Scirpus coronarius* [*Scirpus monander*, deleted]. *Cyperus coronarius*. Koenig ex Ind. orient. [an potius *Kyllinga*, deleted]. Stylus bifidus. Semen oblongum trigonum laeve. Setae nullae.—Culmo triquetro setacco nudo. Involucris subtetraphyllis patentissimis. Umbella sessili obtusa. Spicis obovatis valvulis retusis floribus monandris. Habitat in nemorosis prope Ischandrancona et nullibi aliter observavi. Radices bulbosae. Spiculae omnino niveae. Pulcherrimum Gramen benghalense Koenig."

"Stylus bifidus" is an error of Vahl's; the style is trifid. The specimen undoubtedly belongs to *Cyperus leucocephalus*. It is remarkable that the types of both *Cyperus leucocephalus* Retz. and *Scirpus coronarius* Vahl are based on a König specimen collected "in nemorosis prope Ischandrancona." Probably they belong to the same collection.

C. B. Clarke was the first to unite *C. leucocephalus*, *C. pulchellus*, and *C. sorostachys* under the oldest epithet *leucocephalus*. The only indications that he observed the variability are the remarks in the "Flora of British India": "This plant varies a good deal in the size of the spikelets"; and on the sheet of Brown's type collection of *C. pulchellus* in the Kew Herbarium: "The nut is a little shorter and broader than in the Indian plant." Kükenthal followed Clarke and so the description in the "Pflanzenreich" became a mixture of characters. For, as I already pointed out, Boeckeler was undoubtedly right in distinguishing two species. *Cyperus pulchellus* and *C. sorostachys* are in my opinion conspecific as the slight and inconstant differences do not justify specific separation. In the type of *C. pulchellus* the glumes are about 1 mm long, the achenes measure 0.5—0.55 by 0.25 mm. The type of *C. sorostachys* has longer glumes (1.5—1.8 mm) and larger achenes (0.8—0.9 by 0.3 mm). In general the Australian and African specimens agree very well with *C. pulchellus*, the length of the glumes varying between 1 and 1.4 mm, that of the achenes between 0.5 and 0.6 mm. Only in Allen 175 from North Australia the glumes are 1.6 mm long, the achenes 0.9 mm. The Asiatic specimens which I refer to *C. pulchellus* completely agree with Cuming 1417.

On the other hand *C. leucocephalus* can be distinguished at once by the semiglobose inflorescence, the much smaller number of spikelets to the inflorescence, the broader spikelets (3—4 mm, in *C. pulchellus* only 1.5—2 mm), the 2.5 (rarely 2) mm long glumes which are 5-nerved (3-nerved in *C. pulchellus*), distinctly cucullate at the truncate apex, on the anterior side produced into a small tooth, and by the larger achenes (1.2—)1.5—1.7 mm long, 0.4—0.45 mm wide. The style is usually longer than in *C. pulchellus*, the ripe achene black, much darker than in *C. pulchellus*.

Little is known to me about the distribution of *Cyperus pulchellus*. I have seen specimens from India, tropical Africa, the Philippines (Luzon), and tropical Australia. As far as I know there is only a single Cuming number representing this species, viz., 1417, although Nees cites 2147, Merrill, 1617, and Kükenthal, 417. According to the list of Cuming numbers and localities published by Merrill (*in* Philip. J. Sci., Bot. 10: 183. 1915) Cuming 1417 was collected in Luzon, Province of Nueva Ecija. This agrees with the label of one of the sheets in the Rijksherbarium; the other sheets I have seen, are only labelled "Arch. Philipp." In his "Enumeration of Philippine flowering plants," Merrill indicates as locality: Mindanao (Misamis). This may be incorrect and due to the erroneous citation 1617. Merrill supposed the species not to have been found in the Philippines since

Cuming collected it between 1836 and 1840. In the Gray Herbarium, however, I saw excellent material of it, collected in Luzon (Ilocos Norte Province, Burgos, July 1918, Ramos BS32897).

Cyperus leucocephalus seems to be confined to tropical southern Asia.

In conclusion I give the synonymy of the two species, and a list of the specimens examined.

CYPERUS LEUCOCEPHALUS Retz., Observ. 5: 11. 1789; Vahl, Enum. 2: 313. 1806; Kunth, Enum. 2: 97. 1837; Boeck. *in* Linnaea 35: 590. 1868; C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 107. 1884 p.p.; *in* Hook. f., Fl. Brit. Ind. 6: 602. 1893 p.p.; Kükenth. *in* Engl., Pflanzenr. Heft 101: 278. 1936 p.p. — In nemorosis Tschandranconae, König (LD)!

Scirpus coronarius Vahl, Enum. 2: 261. 1806. — *Isolepis coronaria* (Vahl) Roem. & Schult., Syst. veg. 2: 113. 1817. — *Cyperus coronarius* (Vahl) Kunth, Enum. 2: 44. 1837. — In nemorosis prope Ischandrancona, König (C)!

SE ASIA. In nemorosis Tschandranconae, *König s.n., typus* (LD); ibid., *type* of *Scirpus coronarius* Vahl (C); Monghir, *Wallich 3445c* (K); Amherst, *Wallich s.n.* (K); Bengalia, circa Calcuttam, *Rel. Helf. 147* (BM, BO, L); Tenasserim, *Helfer 6247/1* (K); Moulmein, *Parish 88* (K); Yezu annauk G. G., *U Thein Lwin 28* (K); Cochin China, environs de Bien Hoa, *d'Alleizette s.n.* (L); Burma, Kyaukpyu, Ramru Isl., *E. C. Wallace 114, 184* (BM).

CYPERUS PULCHELLUS R. Br., Prodr. Fl. Nov. Holl. 213. 1810; Kunth, Enum. 2: 110. 1837; Bentham, Fl. austr. 7: 265. 1878; Naves, Novis. App. 301. 1882; F. M. Bailey, Queensl. Fl. 6: 1735. 1902; Domin *in* Bibl. Bot. Heft 85: 420. 1915. — R. Brown 5917!

Cyperus sorostachys Boeck. *in* Linnaea 35: 588. 1868; Scheffer *in* Nat. T. Ned. Ind. 34: 48. 1874. — Based on *Sorostachys kyllingioides* Steud. *in* Flora 33: 229. 1850 (nomen nudum); Syn. Pl. glum. 2: 71. 1855; Miq., Fl. Ind. bat. 3: 296. 1856; non *Cyperus kyllingaeoides* Vahl, Enum. 2: 312. 1806. — Cuming 1417!

Cyperus leucocephalus (non Retz., Obs. 5: 11. 1789, nec Hassk.) sensu Nees *in* Hook. J. Bot. Kew Miscel. 6: 28. 1854; Vidal, Phan. Cuming. Philip. 155. 1885; Rev. Pl. vasc. Filip. 283. 1886; C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 107. 1884 p.p.; *in* Hook. f., Fl. Brit. Ind. 6: 602. 1893 p.p.; *in* J. Linn. Soc., Lond., Bot. 34: 24. 1898 p.p.; *in* Philip. J. Sci., Bot. 2: 82. 1907; Merrill, Enum. Philip. fl. Pl. 1: 106. 1923; Kükenth. *in* Engl., Pflanzenr. Heft 101; 278. 1936 p.p.

AUSTRALIA. Arnhem Bay, *Brown 5917* (BM, *typus*; K); N. Australia, near Darwin, *Allen 175* (K); Queensland, Port Curtis Distr., Gladstone, *S. T. Blake 12795* (K); N. Kennedy Distr., Townsville, *S. T. Blake 13532* (K); Cook Distr., near Mareeba, *S. T. Blake 12397* (K); Gainsford, *Bowman s.n.* (K); Endeavour R., *F. von Müller s.n.* (SING). — INDIA. S. India, Madanapalli, Chittore Distr., *Fischer 4388* (K), Kamalapore, *Mechold 11814* (K); Bengal, *Hooker & Thomson 215bis* (K); Canara & Mysore, *Law s.n.* (K); N. & S. Concan, *Law s.n.* (K); Malabar, Concan, etc., *Stocks & Law 16* (BM, C, L). — PHILIPPINES. Luzon. Prov. Nueva Ecija, *Cuming 1417* (*type* collection of *Sorostachys kyllingioides* Steud.; FI, G, K, L); Ilocos Norte Prov., *Ramos BS32897* (GH). — AFRICA. Kenya, Thika plateau, *Bogdan AB67* (K), N of Mombasa,

FIG. 6. *Cyperus aquatilis* R. Br.: *a*, habit, 0.5 ×; *b*, spikelet, 10 ×; *c*, glumes, 10 and 15 ×; *d*, part of rhachilla, 10 ×; *e*, flower, 10 ×; *f*, deflorate flower, 10 ×; *g*, achene, 10 ×; *h*, anther, 40 ×. — After Anta 121 (BO).

to Lamu and Witu, *Whyte* s.n. (K); N. Nigeria, Katogum Distr., *Dalziel 240* (K); Yola, *Dalziel 287* (K); Gambia, *Ruston 147* (K).

CYPERUS AQUATILIS R. Br.—Fig. 6

Cyperus aquatilis R. Br., Prodr. Fl. Nov. Holl. 213. 1810; Roemer & Schult., Syst. veg. 2: 226. 1817; Kunth, Enum. 2: 110. 1837; Steud., Syn. Pl. glum. 2: 53. 1855; S. T. Blake *in* Proc. roy. Soc. Queensl. 51: 40. 1940; *in* J. Arnold Arb. 28: 219. 1947. — *Cyperus trinervis* R. Br. *var. aquatilis* (R. Br.) Kükenth. *in* Engl., Pflanzenr. Heft 101: 294. 1936. — Nov. Holl. trop., Endeavour River, Banks & Solander.

Cyperus aquatilis belongs to a group of closely allied Australian species, the taxonomy of which has been worked out by S. T. Blake (*l.c.*, 1940). The only record for Malaysia was that of Blake (*l.c.*, 1947): Papua, Western Division, Daru Island, 1934, Brass 6056 (BO, L)! It was also collected in Netherlands South New Guinea: Bivouac Pomboa, swamp, July 16, 1941, Anta 121 (exp. Wentholt) (BO)!

The two specimens of Brass 6056 which I have seen are much stiffer in habit than those collected in Netherlands New Guinea. Their stems are about 2 mm thick, the lowest bract is strictly erect as though continuing the stem, and conspicuously overtops the inflorescence, the longest primary ray being about 10 cm long, the longest bract about 17 cm. This does not agree well with the characters of *C. aquatilis* as given in Blake's key (*l.c.*, 1940). Yet I think the two collections are conspecific, and I refer both to *C. aquatilis*.

The glumes of *C. aquatilis* are said to be neither winged nor serrulate, in contradistinction to those of *C. cristulatus* S. T. Blake. I find the glumes of the New Guinean specimens of *C. aquatilis* narrowly winged (the wing being about 0.15 mm wide), although not serrulate.

CYPERUS SULCINUX C. B. Clarke.—Fig. 7

Cyperus sulcinux C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 56. 1884; Valck. Sur., Gesl. Cyperus Mal. Arch. 63 *t. 2 f. 14*, *t. 8*. 1898; Kükenth. *in* Bot. Jb. 59: 42. 1924; *in* Engl. Pflanzenr. Heft 101: 364 *f. 43*. 1936; S. T. Blake *in* J. Arnold Arb. 28: 220. 1947; *in* Proc. roy. Soc. Queensl. 62: 83 1952. — *Pycreus sulcinux* (C. B. Clarke) C. B. Clarke *in* Hook. f., Fl. Brit. Ind. 6: 593. 1893; *in* Philip. J. Sci., Bot. 2: 80. 1907; E. G. Camus *in* Lecomte, Fl. gén. Indo-Ch. 7: 34. 1912; Merrill, Enum. Born. Pl. 58. 1921; Enum. Philip. fl. Pl. 1: 111 1923; Haines, Bot. Bihar Orissa 5: 906. 1924; C. E. C. Fischer *in* Gamble, Fl. Madras 9: 1627. 1931; Backer, Bekn. Fl. Java, Nooduitg., Fam. 246: 40. 1949.

Although closely allied to and strongly resembling *Cyperus polystachyos* Rottb., with which it is still often confused, *Cyperus sulcinux* is apparently a markedly different species. It may readily be distinguished

FIG. 7. *Cyperus sulcinux* C. B. Clarke: *a*, habit, 0.5 ×; *b*, spikelet, 10 ×; *c*, *d*, glumes, 12.5 ×; *e*, deflorate flower, 12.5 ×; *f*, achene, 12.5 ×; *g*, part of rhachilla, 12.5 ×. — After Backer 947 (BO).

by its annual habit, the relatively short involucral bracts, the shorter rhachis, the usually longer, divergent spikelets, the more remote obtuse glumes, the always single stamen, and mainly by the somewhat asymmetric achene with a shallow median longitudinal depression on both faces. Its area covers India, Further India, Malaysia, and Australia, but everywhere it is very rare. Therefore a survey of the Malaysian localities known to me at present may be useful.

Blake (1952) recorded it for the first time from Australia (Queensland). It had already been collected in Queensland, as appears from specimens in the Leyden Herbarium, distributed as *C. polystachyos* var. *laxiflorus* Benth. (Cairns, Cook Distr., on sandy soil near the sea amongst grasses, alt. 3 ft., Jan. 25, 1931, Hubbard & Winders 6889).

JAVA. West Java. Tjiloa (Zandbasi), alt. 1—50 m, Dec. 29, 1911, *Backer 947* (BO)! Central Java. Prambanan, *Ridley s.n.* (K)! Burubudur, *Ridley s.n.* (K)! Kangean Arch. Sepandjang, road side, alt. 5 m, April 21, 1919, *Backer 28901bis* (BO)! Madura. Burnih, dry field, alt. 10 m, March 8, 1915, *Backer 26677* (BO)! — BORNEO. Sarawak. Nov. 1865, *Beccari 1029* (FI)! Bidi Cave, along trails below cave, 1929, *Clemens 20618* (BO, K, NY)! Punk, open cleared ground, Sept. 1903, *Ridley 12336* (BM, K, SING)! Colony of North Borneo. *Burbidge s.n.* (*paratype*; BM, GH)! Kiau, Mt. Kinabalu, Nov. 1915, *Clemens 10040* (BO)! — PHILIPPINES. *Elmer 6579*, *Merrill Philip. Pl. 548* (acc. to Merrill 1923); *Moseley s.n.* (K). Palawan, Taytay, May 1913, *Merrill BS9278* (BO, BM, GH, K, L, NY, SING, US)! Luzon. Benguet Subprov., Sablang, *Fénix 548* (FI, G, M, U, US)! Twin Peaks, *Elmer 6579* (K)! Kias, Sept. 10, 1904, *Williams 1969* (NY, US)! Bued R., Oct.—Nov. 1905, *Merrill BS4289* (BO, K, NY, US)! Prov. Bulacan, Angat, Sept. 1913, *Ramos BS21743* (BO, BM, GH, K, L, NY, SING, US)! Mindanao. Lake Lanao, Clemens 44 (K). — MOLUCCAS. Talaud Islands. 1924, *Leefmans s.n.* (L)! Ternate. On extinct lava-stream, July 1841, *Forster s.n.* (L)! — NEW GUINEA. Papua. Central Div., Sogere, alt. 450 m, May 1944, *L. S. Smith NG51* (acc. to Blake 1947). Mandated Territory of New Guinea. Friedrich Wilhelmshafen, Oct. 1899, *Nyman 1061* (acc. to Kükenthal 1924).

CYPERUS POLYSTACHYOS Rottb.

Cyperus polystachyos Rottb. f. *longispiculatus* Valck. Sur., Gesl. Cyperus Mal. Arch. 62 *t. 2 f. 13a.* 1898. — *Cyperus polystachyos* Rottb. var. *longispiculatus* (Valck. Sur.) Kükenth. *in* Engl., Pflanzenr. Heft 101: 370. 1936. — Arch. Mal., specimen sine indicatione ulteriore (L)![1]

Valckenier Suringar's description runs as follows: "Differt a forma primaria: radiis longioribus (35 c.M.); paniculis fasciculiformibus; spiculis longissimis (40 m.M.), 2 m.M. latis, 56 floris, lineari lanceolatis, arrectis, pallidis dorsaliter fuscis."

[1] Kükenthal's citation "Kunstler 43" as the type specimen is erroneous; this number was correctly cited by Valckenier Suringar as typical *Cyperus polystachyos*.

The rather defective type specimen is in the Rijksherbarium at Leyden. Any authentic label is wanting; that reading "Ned. Ind." (= Netherlands Indies) was added afterwards. Obviously 35 cm is a misprint (copied by Kükenthal!) for 5 cm. The spikelets are about 3 mm wide in their broadest part, 2 mm towards the top, and up to 60-flowered. The glumes are about 3 (2.9—3.2) mm long, 1.6—1.9 mm wide, relatively distinctly mucronulate. The achene is larger than in Malaysian *Cyperus polystachyos*, 1.3—1.4 mm long, 0.55—0.6 mm wide. On account of these characters I think that the specimen does not originate from Malaysia, but has been mislabelled and should be referred to what in modern North American literature is called *Cyperus filicinus* Vahl, a species confined to saline or more or less brackish stations along the Atlantic coast, and of which I have seen but a few specimens. In Gray's "Manual of Botany" (ed. 8, 241, 1951) *Cyperus polystachyos* and *C. filicinus* are distinguished as follows:

C. polystachyos. Spikelets stramineous, yellowish or ferruginous, linear, 1.2—2 mm broad, 0.5—2(—3) cm long; scales 1.5—2 mm long, narrowly elliptic-ovate, membranaceous, lustreless, obtuse to subacute, barely mucronulate; achenes 0.8—1 mm long.

C. filicinus. Spikelets linear-lanceolate, 1.5—3 mm broad, yellowish to golden brown; scales oblong-lanceolate, 2—3.5 mm long, subcoriaceous, lustrous, acute, the green midrib projecting as a subulus and giving the spikelet a serrate appearance; achenes 1.2—1.4 mm long.

Cyperus filicinus still remains a somewhat critical species. O'Neill (*in* Rhodora 44: 83. 1942) discussed the taxonomy of the two species in question. Although treating them as specifically different, he concluded after a study of several thousand sheets that the only essential characters of *C. filicinus* were: achenes ovate-oblong, 0.6—0.7 mm wide, 1.2—1.4 mm long, subtruncate at the apex, less than half the length of the glume; glumes 1—1.5 mm wide, 2—3.5 mm long; spikelets 2—3.5 mm wide.

There is still a nomenclatural question about *Cyperus filicinus*, to which I draw the attention of American botanists, as unfortunately I am unable to solve it satisfactorily. Vahl's type is from Virginia. In the Copenhagen Herbarium two specimens are preserved as "specimina originalia ex herbario M. Vahl." These are:

(i) "*Cyperus filicinus*, Bosc e Carolina." Very young without ripe achenes.

(ii) *Cyperus virginicus an filicinus* Desf." The achenes measure 1.15 by 0.5 mm, the glumes about 2.5 by 1.3 mm.

Both specimens I would refer to *Cyperus polystachyos* Rottb. If the latter one should be considered Vahl's type, O'Neill's and Fernald's conception of *C. filicinus* does not match that of Vahl's.

The pantropical *Cyperus polystachyos* is extremely polymorphous, and the synonymy of the numerous varieties distinguished is very intricate. Boeckeler's variety *leptostachyus* is recorded by Kükenthal also from the Philippines. Although I did not see all the Philippine collections cited by him, I think this variety does not occur in Malaysia. It is an American taxon, extending from Virginia to the West Indies and from Texas to Ecuador. Good examples of it are in my opinion: Georgia, in uliginosis, Beyrich (as *C. incrassatus nov. spec.*), and Heller 4131 from Arkansas, slender plants with leaves usually longer than the stems, a loose anthela with elongated rays, very long bracts, and narrow divaricate spikelets. Philippine specimens identical with the American ones I have never seen. Merrill 5343 (U!) for instance I take to be typical *Cyperus polystachyos*. Clemens 10040 (BO!), referred to the variety mentioned by Merrill (Enum. Born. Pl. 58. 1921) belongs to *Cyperus sulcinux* C. B. Clarke.

CYPERUS PUMILUS var. MEMBRANACEUS (Vahl) Kükenth.

Cyperus pumilus L. var. *membranaceus* (Vahl) Kükenth. *in* Engl., Pflanzenr. Heft 101: 376. 1936. — *Cyperus membranaceus* Vahl, Enum. 2: 330. 1806; Kunth, Enum. 2: 3. 1837; Steud., Syn. Pl. glum. 2: 3. 1855. — *Cyperus nitens* var. *membranaceus* (Vahl) Boeck. *in* Linnaea 35: 484. 1868. — *Cyperus pumilus* f. *membranaceus* (Vahl) C. B. Clarke *in* J. Linn. Soc., Lond., Bot. 21: 44. 1884. — India Orientalis, König!

Some of the Malaysian specimens of *Cyperus pumilus* L. more or less agree with the description of this variety as given by Kükenthal: "Culmus gracilior ad 15 cm altus. Spiculae lineares usque ad 14 mm longae ad 40-florae sublaxe spicatae. Squamae laxius imbricatae." Apparently Kükenthal placed some rather slender specimens with many-flowered and therefore longer spikelets under this variety. In my opinion such slender forms do not deserve nomenclatural recognition, but even if they should be recognized as representing a separate taxon the epithet "membranaceus" cannot be used for them as they do not agree with the type of *C. membranaceus* Vahl. This conclusion is based on the examination of the two sheets of Vahl's herbarium (Copenhagen Herbarium) preserved as "specimina originalia" of *Cyperus membranaceus*, (i) *Cyperus*. Ind. Orient. König, and (ii) *Cyperus membranaceus*. Ind. Orient.

These were seen by Kükenthal; however, they do not at all agree with his description. The stems are only 8—9 cm tall, the largest spikelets about 7 mm long and about 20-flowered (most spikelets much shorter!). The leaves are 1.5—2 mm wide, some rays of the anthela 1.5—2 cm long. I take them for somewhat depauperated specimens of *Cyperus pumilus* L. Thus Vahl's remark becomes understandable: "Affinis *C. nitenti* [*i.e.*

C. pumilus], differt: spiculis minoribus, alternis, nec ex apice, minime nitidis: valvulae latere griseae, membranaceae." In the course of years the conception of Vahl's *Cyperus membranaceus* changed considerably. It is remarkable that Kunth called the spikelets of *C. nitens* sub-24-flowered, those of *C. membranaceus* 9—11-flowered. Boeckeler described his variety as being more slender, up to 15 cm tall, with often very narrow leaves, elongated rays of the anthela, spicate to subfasciculate spikelets, the lowest ones divergent, and obovate to ovate-elliptic glumes. Clarke distinguished his forma *membranaceus* only by the looser spikes.

CYPERUS NERVULOSUS (Kükenth.) S. T. Blake.—Fig. 8

Cyperus nervulosus (Kükenth.) S. T. Blake *in* Proc. roy. Soc. Queensl. 51: 41. 1940; *in* J. Arnold Arb. 28: 221. 1947. — *Cyperus pumilus* L. var. *nervulosus* Kükenth. *in* Engl., Pflanzenr. Heft 101: 378. 1936. — Queensland: Rockhampton, A. Dietrich 618.

Cyperus pumilus (non L.) *sensu* Valck. Sur. *in* Nova Guinea 8: 696. 1912, non al.

The only New Guinean record of this species is to be found in Blake's treatise on the Cyperaceae collected by L. J. Brass. Already previously it was collected by Koch, whose specimens were referred to *Cyperus pumilus* L. by Valckenier Suringar. In many respects the species recalls *Cyperus squarrosus* L. (= *C. aristatus* Rottb.), especially as to the shape of the spikelets and glumes. *Cyperus nervulosus*, however, belongs to subgenus *Pycreus*, and therefore it is easily distinguishable by the two stigmas and the lenticular achene.

NEW GUINEA. Netherlands New Guinea. South coast, in dune hollow, alt. 1 m, Aug. 15, 1904, *J. W. R. Koch s.n.* (exp. Posthumus Meyjes) (L no. 909.89-46)! Papua. Central Division, Baroka, Nakeo District, common, damp savannah flats, alt. 30 m, April 1933, *Brass 2731* (BO, L, US)!

The variability of CYPERUS SANGUINOLENTUS Vahl

Cyperus sanguinolentus, in the usually accepted circumscription, is an extremely polymorphous species. A natural grouping of the numerous forms will be possible only after the critical revision of extensive material originating from all parts of its large area, associated with thorough experimental research. As the enumeration of forms and varieties given by Kükenthal in Engler's "Pflanzenreich" leaves much to be desired, at least as to the Malaysian portion of the area, I have tried to divide provisionally the material I examined in a more satisfactory way.

Apart from what he considers to be the typical *Cyperus sanguinolentus*, Kükenthal mentions four "formae" and two varieties for Malaysia: forma *humilis* (Miq.) Kükenth. (Junghuhn 510), forma *neurotropis*

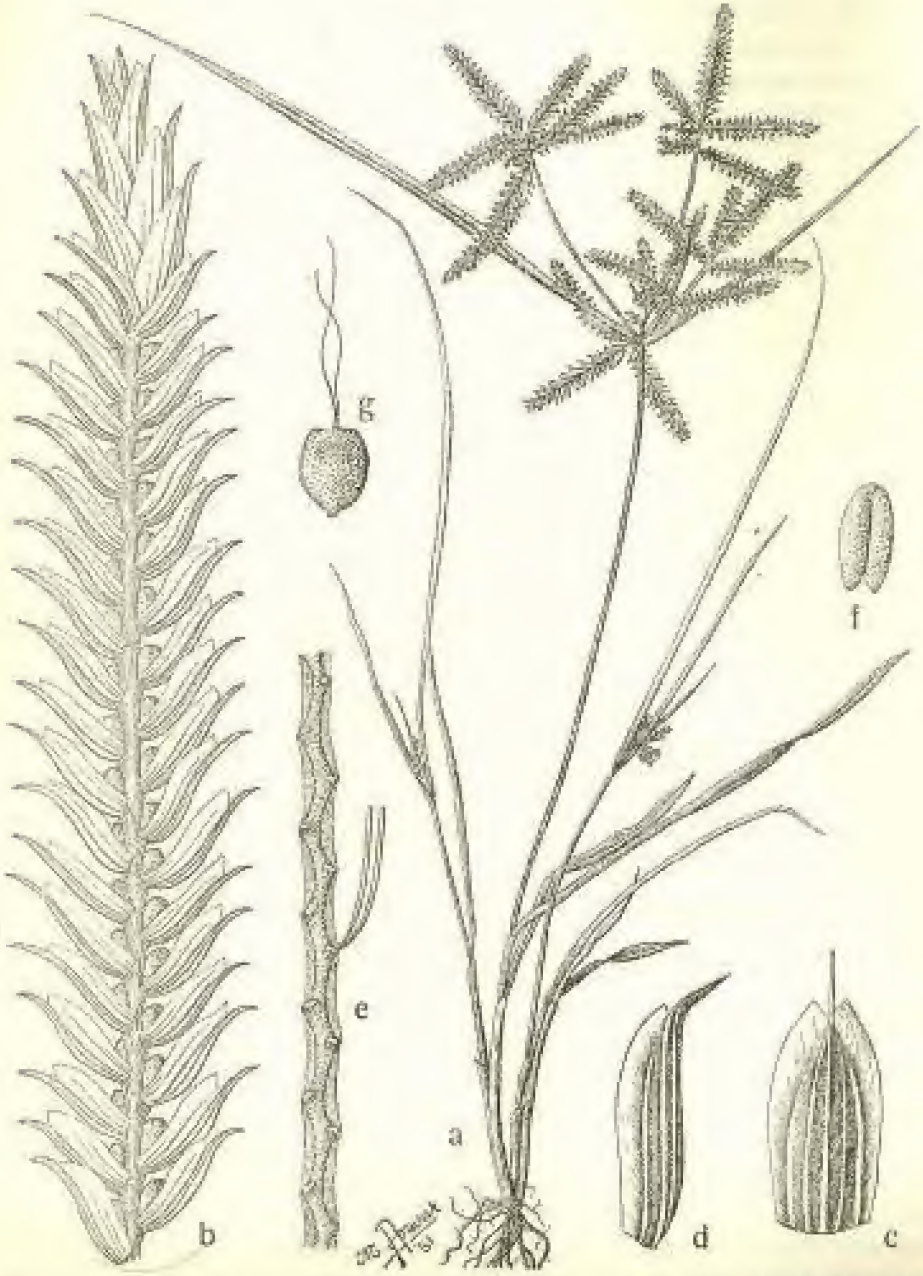


FIG. 8. *Cyperus serrulatus* (Kükenth.) S. T. Blake: *a*, habit, 1 ×; *b*, spikelet, 10 ×; *c*, *d*, glumes, 20 ×; *e*, part of rhachilla, 20 ×; *f*, anther, 50 ×; *g*, achene, 20 ×. — After Brass 3731 (BO).

(Steud.) Kükenth. (Zollinger 1210), forma *cyrtostachys* (Miq.) Kükenth. (Junghuhn *s.n.*, Motley 989), forma *melanocephalus* (Miq.) Kükenth. (Junghuhn *s.n.*, Merrill 4706, Ramos 4893), variety *micronux* (C. B. Clarke) Kükenth. (Kurz 6429, Zollinger 475), and variety *teysmannii* (Boeck.) Kükenth. (Teysmann 6521).

Junghuhn 510, the type-collection of *C. eragrostis* var. *humilis* Miq., represents small specimens of *C. melanocephalus* Miq. The same applies to Griffith 6201 from the eastern Himalaya, also cited by Kükenthal.

Junghuhn 452, the type of *C. eragrostis* var. *cyrtostachys* Miq. is a somewhat luxuriant example of the common diandrous lowland form of *C. sanguinolentus*. The latter form is included by Kükenthal in his typical *C. sanguinolentus*. In Malaysia, however, the diandrous and triandrous forms in general show several well-marked differences.

The type of *C. melanocephalus* Miq. (Junghuhn 537) was, like Junghuhn 510, collected in swampy localities on Mount Dieng at 6200 ft. altitude. Obviously Kükenthal attached but little value to the taxon it represents, but here he was undoubtedly wrong, which is probably best shown by the fact that he himself, unaware that the taxon already bore two names in his monograph, described it in 1943 as a new variety of *C. globosus* All., with which species it has nothing to do.

Kurz 6429 and Zollinger 475, both referred to variety *micronux*, are in my opinion *C. sanguinolentus* with undeveloped achenes. The first number belongs to subspecies *sanguinolentus*, the second to subspecies *cyrtostachys*. Already Clarke in 1884 pointed to the fact that "in omnibus formis *C. Eragrostis* exempla cum nucibus (imperfectis?) minoribus albis interdum obvia sunt."

Teysmann 6521, the type collection of *C. teysmannii* Boeck., is a remarkable *C. sanguinolentus*, as in habit it deceivingly resembles *C. flavescens* L., from which, however, it is very distant by the isodiametric-celled outermost layer of the achene. The taxon it represents is not rare in Sumatra and Java. It is near to the diandrous lowland form, and not always easily distinguishable from it.

I have not seen Zollinger 1210, referred by Kükenthal to forma *neurotropis*. This Zollinger number is the type collection of *C. atratus* Steud., which was considered synonymous with *C. sanguinolentus* by Clarke and Valckenier Suringar. The type of *C. neurotropis* Steud. is Schimper 765 from Abyssinia (ad stagna prope Gapdia d. 30 Septbr. 1838). The Leyden specimens of this collection were referred by Valckenier Suringar to *C. eragrostis* f. *melanocephalus* (Miq.) Valck. Sur., to which they certainly do not belong. The flowers are triandrous, the achene is very small, and

the glumes show an evident depression on each side. The spikelets are about 2 mm wide and the glumes only 1.5 mm long. Perhaps it represents a form of typical *C. sanguinolentus* with small spikelets. I have not seen identical plants from Malaysia.

Tentatively I would arrange the Malaysian material as follows:

KEY TO THE MALAYSIAN TAXA OF C. SANGUINOLENTUS

1. Stamens 3. Leaves flaccid, flat, 2—4 mm wide. Inflorescence often contracted, capitate or nearly so, more rarely the rays up to 3 cm long. Involucral bracts patent. Spikelets usually 2.5—3 (2.25—3.5) mm wide. Glumes (1.75—)2—2.25 mm long, distinctly depressed on both sides, bordered by a well-marked sanguineous band. Achene medium-sized, 1.1—1.25 mm long (very rarely 1 mm), 0.8—1 mm wide. Alt. (250—)800—2000 m. . . . . Ssp. *sanguinolentus*

1. Stamens 2.

2. Achene relatively large, 1.2—1.5 mm long, 0.9—1.25 mm wide. Stems very slender, often short. Leaves narrow, 1—1.5(—2.5) mm wide. Involucral bracts 2—3, the lowest one usually erect or obliquely erect. Inflorescence capitate, paucispiculate, consisting of 3—9(—15) spikelets. Spikelets 2.75—3.5 mm wide. Glumes 2—2.5 mm long, without depressions, usually dark castaneous to nearly black (except for the pale keel and the narrow but distinct whitish hyaline margin), more rarely brown to pale brown. Alt. 1000—3125 m.
Ssp. *melanocephalus*

2. Achene smaller, 0.8—1 mm long, 0.6—0.85 mm wide. Leaves flat, 2—4 mm wide. Involucral bracts spreading. Inflorescence more or less open, or if capitate multispiculate. Glumes 1.6—2 mm long, ferruginous to whitish, often tinged with red. From sealevel up to 750 m alt.

3. Inflorescence more or less open, its rays up to 5 cm long. Glumes with a distinct depression on each side, ferruginous, more or less tinged with red. Spikelets 2.25—2.5 mm wide. . . . . Ssp. *cyrtostachys*

3. Spikelets densely crowded into a multispiculate head, rarely one of the rays somewhat elongated and up to 1 cm long. Glumes without or with indistinct small depressions, yellowish white, rarely somewhat ferruginous or slightly tinged with red, appressed (hence spikelets only about 2 mm wide).
Ssp. *teysmannii*

1. *Cyperus sanguinolentus* Vahl ssp. *sanguinolentus*.

Neotypus.—Flora of NW Himalaya, Distr. Tehri-Garhwal no. 15117, 3000 ft., Oct. 1894, leg. J. S. Gamble (L, no. 951.65-240).

Cyperus concolor Steud., Syn. Pl. glum. 2: 6. 1855. — Hohenacker 946!

As already stated by Kunth (Enum. 2: 7. 1837), *Cyperus sanguinolentus* is not represented in Vahl's herbarium by any specimen named as such. The typical form is widely distributed. I have seen it from India, Further India, Indo-China, China, and Japan. In Malaysia it is rather

common, and known from Sumatra, the Malay Peninsula, Java, the Lesser Sunda Islands (Lombok), Celebes, the Moluccas (Amboina), and the Philippines (Luzon). It occurs in grassy places, swamps, margins of pools, and the like, often in waste places, more rarely in wet rice-fields, usually at medium altitudes (800—2000 m), sometimes lower.

2. **Cyperus sanguinolentus** ssp. **melanocephalus** (Miq.) Kern, *comb. nov.*—Fig. 9.

Cyperus melanocephalus Miq., Fl. Ind. bat. 3: 259. 1856. — *Cyperus eragrostis* f. *melanocephalus* (Miq.) Valck. Sur., Gesl. Cyperus Mal. Arch. 66. 1898. — *Cyperus sanguinolentus* f. *melanocephalus* (Miq.) Kükenth. *in* Engl., Pflanzenr. Heft 101: 387. 1936. — Java, Dieng, Junghuhn 537 (L)!

Cyperus eragrostis var. *humilis* Miq., Fl. Ind. bat. 3: 257. 1856. — *Cyperus eragrostis* f. *humilis* (Miq.) Valck. Sur., Gesl. Cyperus Mal. Arch. 69 *t. 2 f. 19*. 1898. — *Cyperus sanguinolentus* f. *humilis* (Miq.) Kükenth. *in* Engl., Pflanzenr. Heft 101: 386. 1936. — Java, Dieng, Junghuhn 510 (L)!

Cyperus globosus All. var. *latisquamatus* Kükenth. *in* Mitt. thür. bot. Ver. II Heft 50: 7. 1943. — Lörzing 308! — Fig. 9.

This subspecies occurs in swampy, grassy fields, and the like, at high altitudes, from 1000 m upwards. In Malaysia it was collected in several localities in Java, the Philippines, and New Guinea.

MALAY ARCHIPELAGO. — JAVA. Precise locality unknown: *Junghuhn s.n.* (BO). West Java. Bogor, *Boerlage s.n.* (L no. 902.86-146; locality untrustworthy, without authentic label). Kawah Kamodjan, 1500 m, *Popta 22* (BO). Mt. Patuha, 1900 m, *van Steenis 6953* (BO). Central Java. Mt. Prabata, S of Pekalongan, 1350 m, *Backer 15977* (BO). Dieng Plateau, 2050 m, *Blokhuis s.n.* (BO). Dieng, in graminosis paludosis planitiei, 6200 ped., *Junghuhn 510* (L) (*type* of *C. eragrostis* var. *humilis* Miq.); Dieng, in uliginosis planitiei, 6200 ped., *Junghuhn 537* (L) (*type* of *C. melanocephalus* Miq.); Dieng, *Junghuhn s.n.* (U). Dieng, Telaga Tjebong, 2100 m, *van Steenis 4501* (BO). SSE Mt. Pra(h)u, 1800 m, *Lörzing 308* (BO) (*type* collection of *C. globosus* var. *latisquamatus* Kükenth.). Mt. Merbabu, above Tekelan, 2000 m, *Docters van Leeuwen 1195* (BO), summit, 3125 m, *Docters van Leeuwen 1174* (BO). East Java. Garung, N of Bondowoso, 1500 m, *Backer 21995* (BO). — PHILIPPINES. Luzon, Pauai to Baguio, *Merrill 4706* (K, NY, US). — NEW GUINEA. Netherlands New Guinea. Wissel Lake Region, Jawe R., between Enarotali and bivouac Pruuw, 1750 m, *Eyma 4728bis* (BO). East New Guinea. Mt. Tafa area, 2550 m, *Cheeseman s.n.* (L).

From outside Malaysia I have seen this subspecies from the Khasia Mountains [4000 ft., Hooker & Thomson *s.n.* (L); Sikkim, J. D. Hooker *s.n.* (C, U); East Himalaya, Griffith 6201 (C, L)]. The statement (*in* Fl. Brit. Ind. 6: 590), "Sikkim specimens from 10.000 ft, are 4-6 in. high with stem (and leaves) capillary, bearing 1 or 2 spikelets only, and may be a new species," possibly refers to small specimens of this subspecies.

FIG. 9. *Cyperus sanguinolentus* Vahl ssp. *melanocephalus* (Miq.) Kern: *a*, habit, 0.7 ×; *b*, spikelet, 12.5 ×; *c*, glume, 12.5 ×; *d*, part of rhachilla ,12.5 ×; *e*, achene, 12.5 ×; *f*, deflorate flower, 12.5 ×. — After Lörzing 308 (BO).

3. **Cyperus sanguinolentus** ssp. **cyrtostachys** (Miq.) Kern, *comb. nov.*

Cyperus eragrostis var. *cyrtostachys* Miq., Fl. Ind. bat. 3: 257. 1858; Boeck. in Linnaea 35: 445. 1868 ("*cyrtolepis*"); C. B. Clarke in J. Linn. Soc., Lond., Bot. 21: 59. 1884 p.p. — *Cyperus eragrostis* f. *cyrtostachyus* (Miq.) Valck. Sur., Gesl. Cyperus Mal. Arch. 66 *t. 2 f. 16.* 1898. — *Cyperus sanguinolentus* f. *cyrtostachys* (Miq.) Kükenth. *in* Engl., Pflanzenr. Heft 101: 387. 1936. — Java, Djakarta (Batavia), Junghuhn 452 (L)!

This is the common lowland form of wet rice fields, rarely ascending to 450 m. The diandrous Indian specimens which I have tentatively referred to subspecies *cyrtostachys* are not always so markedly different from subspecies *sanguinolentus* as is the case in Malaysia.

4. **Cyperus sanguinolentus** ssp. **teysmannii** (Boeck.) Kern, *comb. nov.*—**Fig. 10.**

Cyperus teysmannii Boeck. in Flora 58: 259. 1875. — *Cyperus eragrostis* f. *teysmannii* (Boeck.) Valck. Sur., Gesl. Cyperus Mal. Arch. 67 *t. 2 f. 17.* 1898. — *Cyperus sanguinolentus* var. *teysmannii* (Boeck.) Kükenth. in Engl., Pflanzenr. Heft 101: 387. 1936. — Sumatra, Lampong, Teysmann 6521! — Fig. 10.

Previously this was known only from the type collection and from two unlocalized Malaysian specimens. I have seen also several collections from Java, and a not quite typical specimen from Luzon, but not yet specimens from outside Malaysia. It occurs along riversides, in swampy places, and wet rice-fields, at low altitudes (up to 750 m).

SUMATRA. Lampong Districts: *Teysmann 6521* (L) (*type of C. teysmannii* Boeck.). — JAVA. Not localized: *L 902.86-122 & 123.* West Java. Between Gua si Gadja and Tjihandjawar, 300—400 m, *Backer 6940* (BO). Bogor, 250 m, *Buwalda 8022* (BO, GRO), *Danser 5687* (BO, GRO), *Hallier 3785, 3790a, b* (BO), *Kern 8236* (BO), *Ophof s.n.* (L), *van Steenis 452, 38290* (BO), *de Wit 4073* (L). Bandung, 700 m, *Popta 25* (BO). Central Java. Forestry Margasari, *Bremèe 5198* (BO). S foot of Mt. Slamet, near Baturaden, 750 m, *Backer 182* (BO); between Purwakarta and Baturaden, 400 m, *Backer 558* (BO). Temanggung, 600 m, *Lörzing 402* (BO). Kebumen, 25 m, *Brinkman 251* (BO). East Java. Muntilan, *Ridley s.n.* (BM). Kediri, *Clason 178* (GRO), *Coert 1713, 1754, 1756, 1767, 1768* (L). Boro, *Clason 278* (GRO). Madura. Between Rapa and Karangpinang, *Backer 20116* (BO, K, L, SING). — PHILIPPINES. Luzon. Manila and vicinity, *Merrill BS 7354* (L, US).

As to the non-Malaysian varieties mentioned by Kükenthal, I have seen several specimens of variety *korshinskii* (Meinsh.) Kükenth. (*C. korshinskii* Meinsh. *in* Acta Hort. petrop. 18: 235. 1900), determined by Kükenthal as such. I take this variety to be a luxuriant form of subspecies *sanguinolentus*. Ohwi (*in* Mem. Coll. Sci., Kyoto, B 18: 153. 1944) also included it in the species.

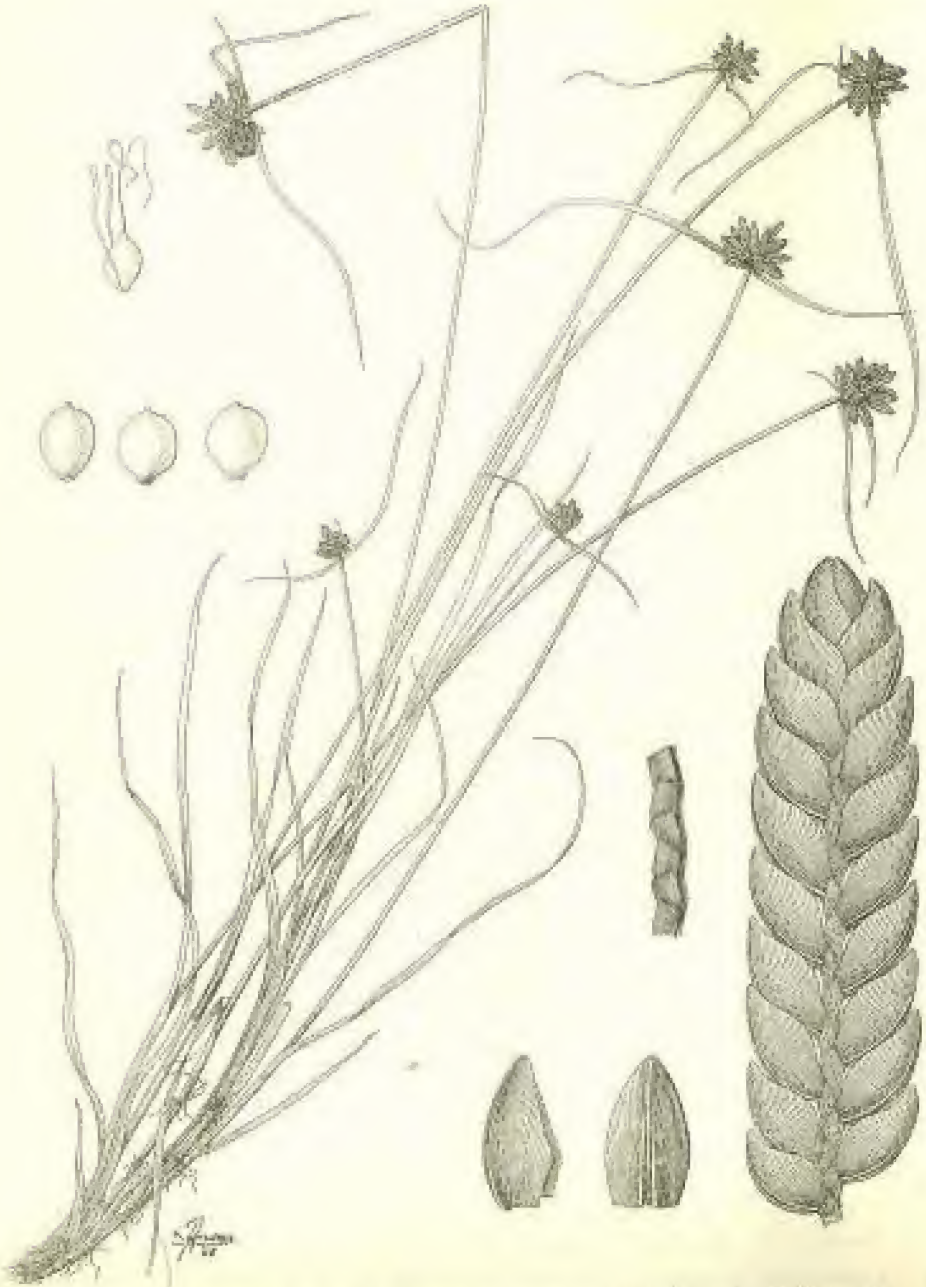


FIG. 10. *Cyperus sanguinolentus* Vahl ssp. *teysmannii* (Boeck.) Kern: habit, 0.5 ×; spikelet, 10 ×; glume, 10 ×; part of rhachilla, 10 ×; defloratc flower, 10 ×; achene, 10 ×. — After Hallier 579a (BO).

On the other hand variety *areolatus* (R. Br.) Kükenth. (*C. areolatus* R. Br., Prodr. Fl. Nov. Holl. 216. 1810) is apparently a well-marked geographical race, confined to Australia. In habit it recalls subspecies *sanguinolentus*, from which it differs by the blackish band bordering the glumes and by the two stamens. S. T. Blake (*in* Proc. roy. Soc. Queensl. 51: 42. 1940) was of the opinion that it was distinguished "solely by the blackish margins of the glumes, a character which is very inconstant even in the same inflorescence," but I cannot agree with him. Kanehira & Hatusima 13567 from New Guinea was referred by Ohwi (*in* Bot. Mag., Tokyo 56: 200. 1942) to this variety. I have not seen this number.

The indentity of MARISCUS MARITIMUS Miq.

Mariscus maritimus Miq., Fl. Ind. bat., Suppl. 550. 1861. — *Cyperus maritimus* (Miq.) Valck. Sur., Gesl. Cyperus Mal. Arch. 160 *t. 6 f. 13*. 1898; Koorders, Exkursionsfl. Java 1: 187. 1911; *non* Poir. — Banka, sea shore near Mintok (Muntok), sandy localities, Sept. 1858, Kurz s.n. (U)!

Kükenthal in his monograph (p. 562) refers *Mariscus maritimus* Miq. to *Cyperus merrillii* (C. B. Clarke) Kükenth. (*Mariscus merrillii* C. B. Clarke *in* Philip. J. Sci., Bot. 2: 87. 1907). The latter species is very near to *Cyperus dubius* Rottb. and resembles it deceivingly. The following features differentiate *C. merrillii* from *C. dubius:*

Leaves narrow, 1.5—3 mm wide. Inflorescence a smaller, simple head 1—1.5 cm long and wide. Spikelets few-flowered, linear-oblong, 5—7 mm long, 1 mm wide. Lowest internode of the rhachilla about 2 mm long. Glumes oblong-lanceolate, the largest one 4 mm long, 1.6—2 mm wide when flattened out. Achene narrow, oblong-linear, (2—)2.25—2.5 mm long, 0.75 mm wide.

Clarke described *Mariscus merrillii* as having the stems only 4—7 cm tall, and globose inflorescences 10—12 mm in diameter (type collection from Maragondong, Cavite Prov., Merrill 4170, K!). Obviously also Kükenthal only saw very small specimens (4—9 cm tall), with very narrow leaves (1.5 mm wide), and small inflorescences (10—12 mm in diameter). Some specimens of Ramos 32826 I examined (BM, BO, K, L, SING, US), however, are up to 25 cm tall, with leaves up to 3 mm wide, and heads about 1.5 cm long and wide. This number was considered by Merrill (*in* Philip. J. Sci. 14: 369. 1919; *in* Enum. Philip. fl. Pl. 1: 113. 1923) to belong to *Mariscus niveus* (Murr.) Merr., but undoubtedly represents *Cyperus merrillii*, to which species it had already been referred by Kükenthal. Kerr 7023 (SING) from Siam (Me Sak, Saraburi), which I take to be

C. merrillii on account of the shape and size of the spikelets and achenes, is still much taller (about 45 cm), with involucral bracts up to 30 cm long. In *Cyperus dubius* the spikelets usually bear several achenes, but spikelets bearing only two achenes also occur. Thus far the only reliable characters to distinguish *C. dubius* from *C. merrillii* seem to be found in the glumes and achenes. Further investigation is necessary to find out whether or not *C. dubius* and *C. merrillii* are distinct species. Their delimitation from some African taxa of the difficult section *Bulbocaules* should also be taken into consideration.

Valckenier Suringar described the type specimen of *Cyperus maritimus* (Miq.) Valck. Sur. as having the stems only 10 cm tall, the leaves narrow (2 mm wide), the inflorescence small (8 mm wide, 11 mm long), the spikelets 2-flowered, the glumes oblong (3 mm long, 1 mm wide), and the achene narrowly obovoid, the apex included, 2 mm long, 0.75 mm wide. In referring *C. maritimus* to *C. merrillii*, Kükenthal, who did not see the type, was obviously misled by this description. It should be remembered that Valckenier Suringar's descriptions of the glumes always refer to their lateral view, when they are still conduplicate (cf. Gesl. Cyperus Mal. Arch. 32), so that in reality the glumes are described as being 3 mm long and 2 mm wide when unfolded, consequently rather ovate and not oblong-lanceolate, which agrees with the details of his plate 6, figure 13. The shape and size of the achene as represented in this figure, are hardly different from those in his figure 5, representing *C. dubius*. Besides, the examination of Kurz's specimen in the Utrecht herbarium convinced me that *Mariscus maritimus* Miq. is undoubtedly a small specimen of *C. dubius*. The achenes are not 2 mm long, but 1.7 mm, and 0.75 mm wide.

It appears that *Cyperus merrillii* is restricted in Malaysia to the Philippines (Luzon), where it occurs on wet banks in ravines and on dry open rocky slopes at low altitudes; it is absent from the western part of Malaysia, and not a plant of sandy sea shores.

Cyperus dubius, widely distributed in the African steppes, extends through India and Further India to China; in Malaysia (fig. 11) it is confined to the western part, where it is common on both coasts of the Malay Peninsula, and on the sandy beaches of Sumatra's East Coast Residency; further it extends along the shores of the South China Sea: Victory Island near Borneo, the Anambas and Natuna Islands, the Riouw Archipelago, the Banka-Billiton group, Merak Island in the Sunda Straits, extending to the southwest coast of Java (Palabuanratu, Wijnkoopsbaai).

Miquel recorded *C. kyllingaeoides* Vahl = *C. dubius* Rottb. also from the Moluccas (Hitu, Ambon, Little Ceram), but this is based on Kunth's

FIG. 11. Distribution of *Cyperus dubius* Rottb. in Malaysia.

erroneous interpretation of Rumphius's figure (Herb. amb. 6: *t. 2 f. 1*). Miquel's misstatements were copied by Valckenier Suringar and even by Kükenthal, although Merrill's reduction of Rumphius's excellent figure to *Remirea maritima* Aubl. is undoubtedly right.

CYPERUS TRICEPS (Rottb.) Endl.

Cyperus triceps (Rottb.) Endl., Cat. Hort. vindob. 1: 94. 1842; Valck. Sur., Gesl. Cyperus Mal. Arch. 50 *t. 2 f. 6*. 1898; Kükenth. *in* Engl., Pflanzenr. Heft 101: 578. 1936. — *Kyllinga triceps* Rottb., Descr. et Ic. 14 *t. 4 f. 6*. 1773. — India orient., König.

Kyllinga cylindrica (*non* Nees) *sensu* C. B. Clarke *in* Hook. f., Fl. Brit. Ind. 6: 588. 1893 quoad specim. malacc.; Ridl., Mat. 3: 59. 1907; Fl. Mal. Pen. 5: 138. 1925.

In the "Flora of British India," C. B. Clarke (*l.c.*) records *Kyllinga cylindrica* Nees from Singapore (*leg.* Hullett), which statement is also found in Ridley's "Materials" and "Flora of the Malay Peninsula" ("Hullett 2195"), and in Kükenthal's monograph ("Hullett 495"). Presumably all refer to the same collection of which I have seen a sheet preserved in the Singapore Herbarium: Singapore, weed on sandy lawn of the Raffles Institution, August 1885, Hullett 2195. These specimens, however, are neither identical with those of the type collection of *Kyllinga cylindrica*

Nees β. *monostachya* (Wallich 3442), nor with the copious, rather uniform Malaysian material of *Kyllinga cylindrica* Nees = *Cyperus sesquiflorus* (Torr.) Mattf. & Kükenth. var. *cylindricus* (Nees) Kükenth. which I examined. The central head is subglobose, not elongate-cylindrical, the lateral ones are nearly globose and only slightly smaller; the achene is oblong, about 1.25 mm long and about 0.5 mm wide (half as wide as in *C. sesquiflorus* var. *cylindricus*), yellowish brown, and not truncate. In my opinion they belong to *Cyperus triceps* (Rottb.) Endl., a very variable species, known from the Asiatic and Australian continents, but not yet recorded from Malaysia.

CYPERUS AROMATICUS (Ridl.) Mattf. & Kükenth.

Cyperus aromaticus (Ridl.) Mattf. & Kükenth. *in* Engl., Pflanzenr. Heft 101: 581. 1936. — *Kyllinga aromatica* Ridl. *in* Trans. Linn. Soc. II 2 (Bot.) 2: 146. 1884. — Welwitsch 6801.

Kyllinga polyphylla Willd. ex Kunth, Enum. 2: 134. 1837; Steud., Syn. Pl. glum. 2: 69. 1855; Boeck. *in* Linnaea 35: 409. 1868; C. B. Clarke *in* Thiselt.-Dyer, Fl. trop. Afr. 8: 276. 1902; *non Cyperus polyphyllus* Vahl. — Herb. Willdenow 1441.

This species is very near to *Cyperus melanospermus* (Nees) Valck. Sur. It differs mainly in the more numerous, (5—)7(—8) involucral bracts. The inflorescence is subglobose, consisting of a terminal head and some smaller ones in the axils of the involucral bracts, all confluent into a head about 1 cm in diameter. The glumes are more distinctly mucronate.

The specimens cited below belong to the stout variety *elatus* (Steud.) Kükenth. (*in* Engl., Pflanzenr. Heft 101: 582. 1936; *Kyllinga elata* Steud., Syn. Pl. glum. 2: 70. 1855, *non Cyperus elatus* L. — Ins. Comoro, Boivin).

Up to 90 cm tall. Stems rigid, strongly compressed, 2—3 mm wide. Involucral bracts up to 7 mm wide. Spikelets 4 mm long.

Native of East Africa, introduced and naturalized in Singapore Island, where it is now very abundant in grassy open places.

MALAY PENINSULA. Singapore, Aug. 21, 1941, *Corner s.n.* (SING), June 26, 1951, *Holttum s.n.* (BO).

Cyperus melanospermus ssp. **bifolius** (Miq.) Kern, *comb. nov.*—Fig. 12

Kyllinga bifolia Miq., Fl. Ind. bat. 3: 293. 1856. — *Cyperus brevifolius* f. *vaginatus* Valck. Sur., Gesl. Cyperus Mal. Arch. 47 t. 2 f. 1 1898 p.p. — Junghuhn 439 (U)!

Kükenthal placed the name *Kyllinga bifolia* Miq. with doubt under the synonyms of *Cyperus melanospermus* (Nees) Valck. Sur. Previously it had been treated by Valckenier Suringar as a form of *C. brevifolius*

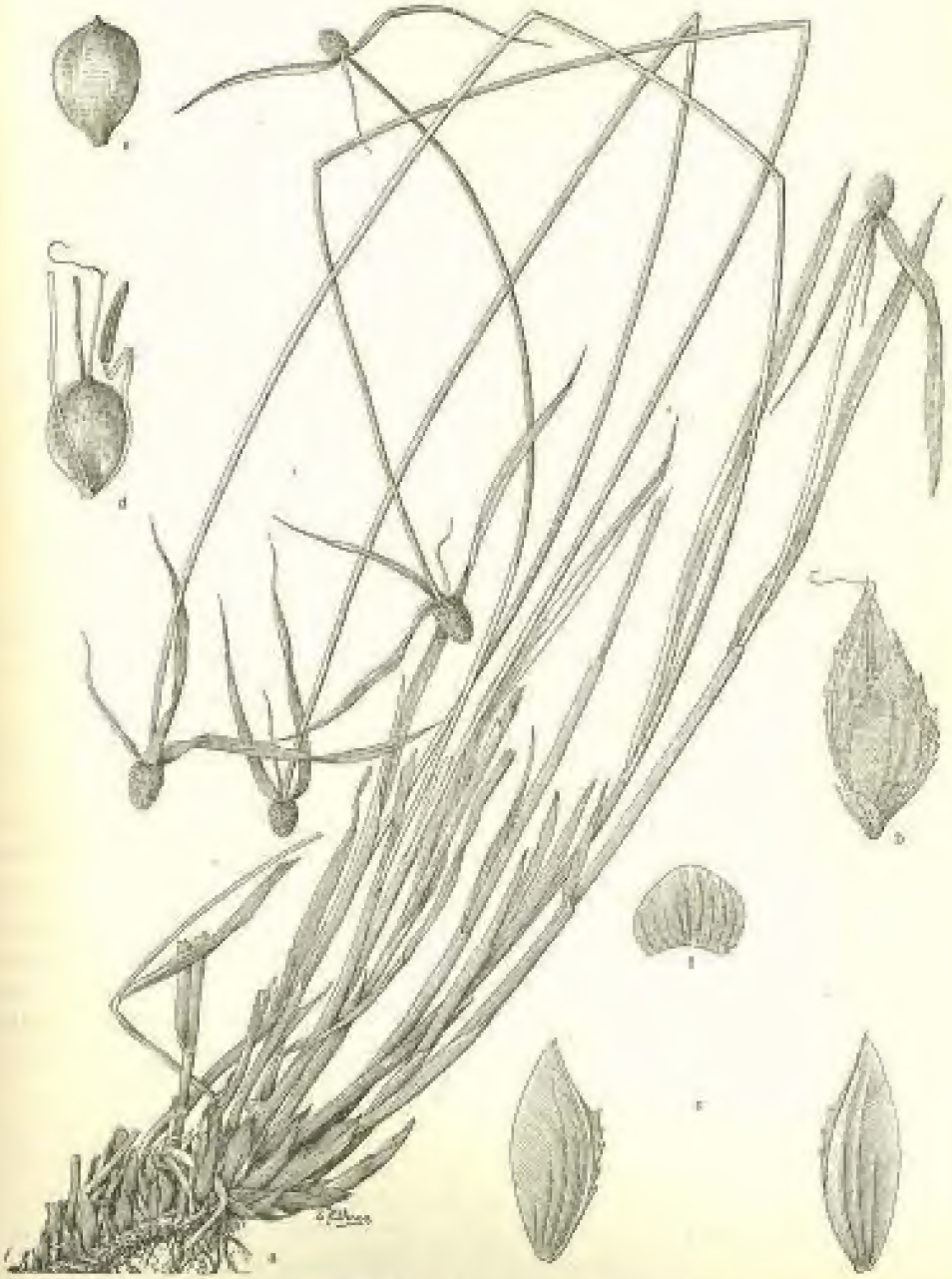


FIG. 12. *Cyperus melanospermus* (Nees) Valck. Sur. ssp. *bifolius* (Miq.) Kern: *a*, habit, 0.5 ×; *b*, spikelet, 10 ×; *c*, glumes, 10 ×; *d*, deflorate flower, 10 ×; *e*, achene, 10 ×; *f*, prophyll, 10 ×. — After Van Steenis 4360 (BO).

(Rottb.) Hassk. This diversity of opinion exactly marks the systematic position of this taxon, which in many respects is intermediate between *C. melanospermus* and *C. brevifolius*. In habit it strongly resembles the former, from which it can be distinguished by the usually shorter stems, the fairly developed leaves, and by the quite different shape of the spikelets and achenes.

Typical *C. melanospermus* is characterized by:

Stems 30—175 cm tall, 2—4 mm thick; leaves practically all reduced to membranous, purplish-red sheaths, only the upper one or two being shortly laminate; inflorescence very dense, (6—)10—12(—16) mm long, 6—8(—10) mm wide; spikelets oblong-elliptic, 3—4.5 mm long, only 1 mm wide; glumes ovate-lanceolate, the first one 2.5—3.5 mm long, the second 3.5—4 mm, with distinct ferrugineous nerves, and the keels but slightly spinulose, usually nearly smooth; achene oblong or elliptic-oblong, 1.5—2 mm long, 0.6—0.75 mm wide, ultimately black.

Cyperus melanospermus ssp. *bifolius* is characterized by:

Stems up to 75 cm tall, about 2 mm thick; 1—2 leaves 10—25 cm long, 3—4 mm wide; spike 6—10 mm long, 6—8 mm wide, less dense; spikelets ovate-elliptic, 3—3.5 mm long, 1.25—1.5 mm wide; glumes elliptic-ovate with evidently serrulate-spinulose keels, the first one 2.5—3 mm long, the second 3—3.25 mm; achene broadly elliptic to obovate, 1.5 mm long and 1—1.2 mm wide, yellowish brown.

This latter subspecies is much stouter than *C. brevifolius*, the leaves are relatively smaller, the spikes and the achenes larger, and, as in *C. melanospermus*, there are always three stamens. Its affinity to *C. melanospermus* is mainly shown by the thick, woody rhizome with very short internodes covered by large, ovate-lanceolate, fuscous sheaths, by which it is referable to subsection *Pingues* Kükenth. As also in other respects the relationship to *C. melanospermus* is much closer than that to *C. brevifolius*, I can not agree with Valckenier Suringar, who placed it under the latter species. Besides, Valckenier Suringar did not well distinguish it, for most of the specimens cited by him are *C. melanospermus* ssp. *melanospermus*.

MALAY PENINSULA. Pahang. Cameron Highlands, not typical, *Vesterdal 356* (C, SING). — JAVA. Sine loco, *Junghuhn 139* (U; *typus*). West Java. Mt. Tangkuban Prahu, *s. coll.* (L *no. 902.79-514*). Mt. Djaja, N of Mt. Papandajan, 2000 m, *van Steenis 4360* (BO). Mt. Papandajan, 2500—2500 m, *Koorn 466* (BO), *van der Pijl 550* (BO), *van Steenis 5185* (BO), *4321* (BO, U). Tjiskaspu, 2000 m, *van Slooten 2614* (BO). Tjinjiruan, *Rant s.n.* (BO). Central Java. Mt. Dieng, *van der Meer Mohr s.n.* (BO). Dieng, Telaga Balekambang, 2000 m, *van Steenis 4535* (BO). East Java. Mt. Kawi, 2650 m, *Arens s.n.* (BO), *Doctors van Leeuwen 12384* (BO), 1300 m, *Koppard*

6 (BO). Mt. Welirang (Ardjuno), 2700 m, *van Steenis 7048* (BO, GH, SING). Munggal pass, 2000 m, *Wisse 505* (BO). Saddle Tengger-Ajekajek, *Gisius 4* (L). Tengger-Tosari, *Kobus 314* (BO). Tengger-Widodaren, 2200 m, *Koorders 37449* (BO). N slope Tengger Mts., 1100 m, *K. de Vries s.n.* (L). Mt. Semeru, 1750 m, *Backer 3714* (BO). Hjang plateau, 3020 m, *Koorders 43950* (BO). Mt. Idjen, *Jeuniet 980* (WAG). Ungup-ungup, 5600 ft., *Zollinger 3993* (L). Mt. Merapi, 1900—2100 m, *Backer 25310* (BO). — LESSER SUNDA ISLANDS. Bali. S slope Mt. Agung, 1500 m, *van Steenis 7884* (BO). — NEW GUINEA. Papua. Strickland R., *Bäuerlen 325* (MEL).

CYPERUS SESQUIFLORUS var. CYLINDRICUS (Nees) Kükenth.

Cyperus sesquiflorus (Torr.) Mattf. & Kükenth. var. *cylindricus* (Nees) Kükenth. *in* Engl., Pflanzenr. Heft 101: 533. 1936. — *Kyllinga cylindrica* Nees in Wight, Contr. Bot. Ind. 91. 1834; Kunth, Enum. 2: 133. 1837; Steud., Syn. Pl. glum. 2: 68. 1855; Boeck. *in* Linnaea 35: 415. 1868 p.p.; C. B. Clarke *in* Hook f., Fl. Brit. Ind. 6: 588. 1893, excl. specim. malacc.; *in* Philip. J. Sci., Bot. 2: 79. 1907; E. G. Camus *in* Lecomte, Fl. gén. Indo-Ch. 7: 23. 1912; Merrill, Enum. Philip. fl. Pl. 1: 115. 1923; Ohwi *in* Mem. Coll. Sci., Kyoto, B 18: 163. 1944; Backer, Bekn. Fl. Java, Nooduitg., Fam. 246: 44. 1949 p.p.; *non Cyperus cylindricus* Boeck. — *Kyllinga odorata* var. *cylindrica* (Nees) Kükenth. *ex* Merrill *in* J. Str. Br. R. As. Soc. 76: 80. 1917; Merrill, Enum. Born. Pl. 58. 1921. — Royle 39.

Cyperus viridulus sensu Valck. Sur., Gesl. Cyperus Mal. Arch. 51 *t. 2 f. 7, 9.* 1898, quoad specim. cit., *non Kyllinga viridula* Hochst. (basonymum), *nec Cyperus viridulus* Boeck.

This taxon occurs in tropical Africa and southeastern Asia, where it extends from India to Yunnan, Formosa (see Ohwi, *l.c.*), and Malaysia. In the latter region it is very rare. Valckenier Suringar mentions only a "specimen sine indicatione ulteriore," and, besides the erroneous statement for Singapore, we find in Kükenthal's monograph but two collections from Java and four from the Philippines. The localities hitherto known are given below. The plant occurs at low and medium altitudes, usually between 1000 and 1600 m. Van Steenis 12568 was collected between 300 and 600 m, Buwalda 5358 at a few meters altitude. Its occurrence in the Bogor Botanic Gardens (about 250 m) is possibly due to introduction. The statement in Backer's "Flora" (*l.c.*) "1000—3000 m," was obviously due to the fact that Backer referred some specimens of *C. melanospermus* and of its subspecies *bifolius* to *C. sesquiflorus* var. *cylindricus*; hence he also said that the plant, which was 1—3 dm tall, should reach a length of 1.25 m.

Clarke (1907) was of the opinion that *Kyllinga cylindrica* is represented in the New World by *K. odorata* Vahl, which according to him might be treated as a geographical variety. Kükenthal shared this view and reduced *K. cylindrica* to varietal rank. The rather few specimens of *C. sesquiflorus* (= *K. odorata*) I examined did not convince me of the cor-

rectness of this procedure, but as raising to specific rank in *Cyperus* would require a new epithet, I use Kükenthal's name for the time being.

MALAY ARCHIPELAGO. Exact locality unknown: *Hochstetter 1841* (according to Valck. Sur., and Kükenthal 1936). — SUMATRA. Atjeh. Bur ni Telong, *van Steenis 6850* (BO, GH, L, SING)! Tapanuli. Parsoburan, *Lörzing 7824* (BO)! East Coast. Berastagi, *Ridley s.n.* (K)! Mt. Sinabung, *Lörzing 8282* (BO)! Karo Plateau, *Lörzing 4851, 4885, 6065, 6254, 6886* (BO)! Toba Lake, *Lörzing 7236* (BO, L)! *8196* (BO)! — JAVA. West Java. Bogor, Bot. Gardens, spontaneous, *Backer 32687* (BO)! *Kern 7587, 7928* (BO)! Tjibodas, *Kern 7183* (BO)! Near Bandung, *Mrs. Carnon Roberts s.n.* (K)! Cheribon, Nunuk-Tjihau, *van Steenis 12568* (BO)! Central Java. Magelang, *Hochreutiner 2330* (according to Kükenth. 1936). East Java. Bajalali, *Beguin s.n.* (BO, L)! Mt. Lawu, *Jacobson s.n.* (BO)! — LESSER SUNDA ISLANDS. Bali. Mt. Abang, *van Steenis 8004* (BO, L)! — BORNEO. Colony of North Borneo, *Clemens 9823* (according to Merrill 1921). — PHILIPPINES. Luzon. Benguet Subprov., *Merrill 571* (FI, G, M, U)! Baguio, *Elmer 6580* (BO, K, NY)! *Williams 1225* (NY)! Pampanga Subprov., Mt. Pinatubo, *Elmer 22365* (BO, C, G, GH, K, L, NY)! Mindanao. Lake Lanao, *Clemens 102* (K)! Merrill (1923) mentions also: *Fénix BS26033*, *Ramos BS10980*, and *Robinson BS15033*, not seen. — NEW GUINEA. Aru Islands. Trangan I., *Buswalda 5858* (BO)!

Two species of CYPERUS new to the Philippines

Soriano PNH16413 (L; from Panay, Iloilo Prov., Batuan, Sara, Aug. 30, 1952) is a fine specimen of *Cyperus babakan* Steud., up till now only known from some localities in the Malay Peninsula, Java, Borneo, and Celebes (cf. Kern *in* Reinwardtia 2: 105. 1952).

Williams 1971 (from N Luzon, Trinidad, Prov. Benguet, Sept. 28, 1904) was cited both by Merrill (Enum. Phil. fl. Pl. 1: 111. 1923) and by Kükenthal (*in* Pflanzenr. Heft 101: 339. 1936) under *C. unioloides* R. Br. The specimens I have seen (NY, US) belong to *C. latespicatus* Boeck. (cf. Kern *in* Reinwardtia 2: 124. 1952).